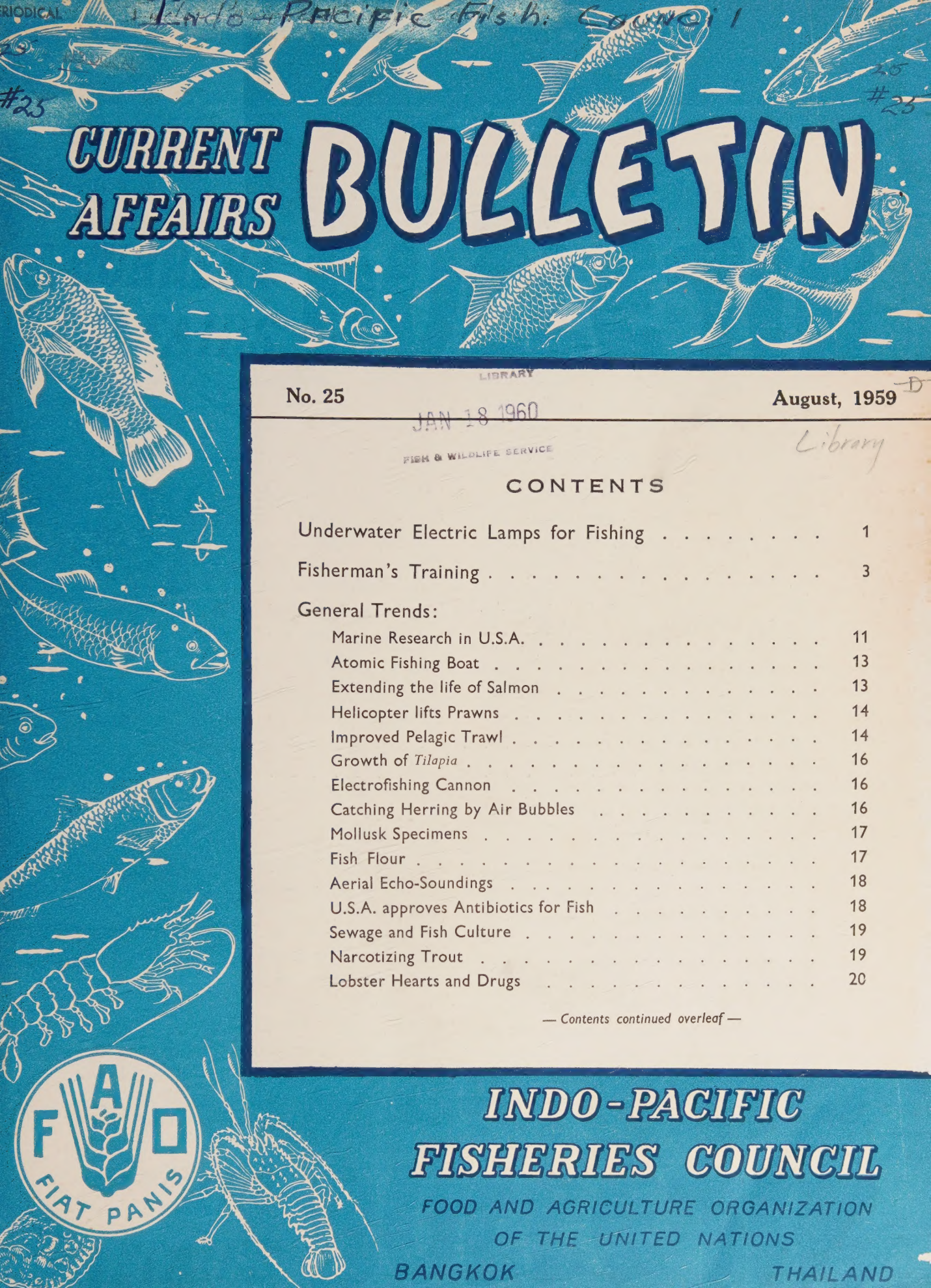




INDO-PACIFIC Fisheries Council

CURRENT AFFAIRS

BULLETIN

No. 25

LIBRARY

August, 1959

JAN 18 1960

FISH & WILDLIFE SERVICE

Library

CONTENTS

Underwater Electric Lamps for Fishing	1
Fisherman's Training	3
General Trends:	
Marine Research in U.S.A.	11
Atomic Fishing Boat	13
Extending the life of Salmon	13
Helicopter lifts Prawns	14
Improved Pelagic Trawl	14
Growth of <i>Tilapia</i>	16
Electrofishing Cannon	16
Catching Herring by Air Bubbles	16
Mollusk Specimens	17
Fish Flour	17
Aerial Echo-Soundings	18
U.S.A. approves Antibiotics for Fish	18
Sewage and Fish Culture	19
Narcotizing Trout	19
Lobster Hearts and Drugs	20

— Contents continued overleaf —



INDO-PACIFIC FISHERIES COUNCIL

FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS

BANGKOK

THAILAND

News from Member Governments:

Australia	21
Burma	22
Ceylon	22
Federation of Malaya	24
France and U.K. New Hebrides	28
India	28
Indonesia	33
Japan	34
Korea	35
Pakistan	40
Philippines	43
Taiwan	46
U.K. : Hong Kong	47
Singapore	49
U.S.A. : Hawaii	49

FAO Activities:

Staff Movements	50
Technical Assistance	51
Fellowships	52

IPFC Affairs	52
------------------------	----

Personalia	53
----------------------	----

Current Reading	53
---------------------------	----

Meetings and Conferences:

Marine Science Research	56
Research Vessels	56

Forthcoming Meetings and Training Centers	57
---	----

UNDERWATER ELECTRIC LAMPS FOR LIGHT FISHING

by

H. Kristjonsson

Chief, Fishing Gear Section

FAO Fisheries Division, Rome, Italy.

Some Italian purse seine fishermen have in recent years replaced their traditional kerosene or gas pressure lamps with underwater electric lamps. Normally two 500W lamps are submerged approximately 3 to 4 ft. below the surface under a small boat which carries a gasoline or diesel powered electric generator set of 2 to 3 KW. Occasionally an additional light is also used above the water. Such above-water lights give a wide horizontal spread of light, but naturally they are mainly useful when the sea surface is unruffled. 32 V generators are normally used with 24 V lamps. Thus the light intensity can be varied from yellowish light over to bright white despite the voltage drop in the rubber cables.

Commonly the intensity of the light is kept constant, although theoretically it would seem advantageous to use a light of maximum intensity and brightness during the early stages, in order to obtain maximum range for attracting fish into the area under the lamps, and then gradually dim the light somewhat to compact the school before setting the net around it. Of course, any change in light intensity will have to be extremely gradual so as not to scare the fish which often seems to be extremely sensitive.

Before sunset each purse seiner usually tows out to the fishing grounds two light boats which are anchored at a considerable distance from each other. One man is left in each boat to tend the lights and to look for signs of fish gathering below, such as air bubbles rising to the surface when the fish jettison air from their swimming bladders in order to maintain neutral buoyancy when swimming up to shallower depths. If no signs of fish are noticed after two or three hours, the light boats may be moved to another place.

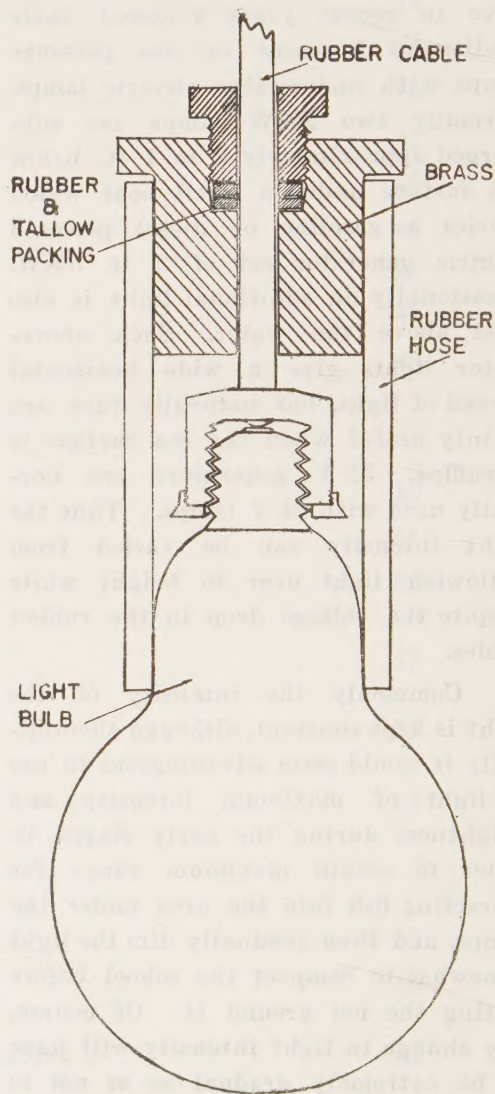
From time to time the purse seine boat communicates with the light boats and when it is decided to make a set, the man in the light boat ties its anchor rope to a float with a small lantern and drifts or rows very slowly a short distance away, in order to enable the purse seiner to set the net around the school without interference from the anchor rope. As soon as the net has been shot and pursing begins, the light boat is rowed slowly towards and across the centrepiece of the corkline in order to induce the fish to swim away from the opening of the net under the purse seiner. The light boat remains just outside the net until pursing is completed, when it returns to the anchor buoy or transfers to another likelier fishing spot.

Although some underwater lamps are available as a standard commercial commodity most of the Italian fishermen have their lamps made in local workshops. FAO bought several lamps in Fiumicino (a small fishing place at the mouth of the Tiber) at about Stg. £15.0.0. each with a suitable length of rubber covered electric cable of not less than 3 mm.² conductor cross section.

First step, obtain the electric bulb; then find a strong rubber hose, such as automobile radiator hose which fits closely over the neck of the bulb. An ordinary socket can be used with the bulb as it is dry and well protected by the rubber hose which fits at the upper end closely over a brass cylinder through which is drilled a central hole for the rubber cable. To prevent water from entering along the cable, ordinary tallow packing or a conical rubber packing can be used. Several coats of shellac should be applied where the rubber hose meets the bulb and the brass cylinder. A small reflector above the bulb will improve the illuminating efficiency and a heavy weight must be attached below the bulb to keep the lamp vertical.

Compared with above-the-surface lights, the main advantages of underwater lamps are: better utilization of the light as there is no loss due to reflection from the sea surface and a less powerful light is needed (when underwater lamps were adopted by sardine boats in a Tunisian fishing village after a demonstration by an FAO expert the savings in fuel were estimated at about Fr. 1,000,000 per night); the underwater light is steady while the above-the-

surface lamp gives a flickering uneven light, especially when the surface is ruffled. With underwater lamps the fishermen are able to attract fish effectively in rougher weather, and less time is lost during the full moon period. Better penetration is achieved in turbid water and fishing can be resumed earlier after rains and storms.



FIGURE

CONSIDERATION ON FISHERMEN'S TRAINING

by

P.A. Lusyne

Fisheries Training Specialist

FAO, Rome.

ABSTRACT

The introduction of new fishing methods and more modern gear is in most cases the quickest way of increasing the fish production in underdeveloped areas. Such new gear, however, requires skilled labour to operate the gear in an efficient manner.

This paper deals with the psychological aspects of training illiterate fishermen and the organization of fishermen's training courses. Material requirements and curriculum are also discussed.

Introduction

In considering the possibilities of improving the standards of nutrition in maritime underdeveloped countries, one naturally turns to the sea with its stock of protein-rich food, to provide a rapid solution to the problem. A simple arithmetical consideration would indicate that if bigger and faster boats, larger and better fishing gear used more efficiently were employed, fish production could easily be increased to many times that of the present landings. The problem is, however, much more complicated because the development and exploitation of modern fisheries give rise to and are intimately connected with many other problems in the affiliated fields of the fisheries industry.

Increased fish landings will require an efficient marketing arrangement, a good transport system to deliver the fish to the hinterland and carry supplies to the vessels, adequate ice production, cold storage, fish processing plants, boat building yards, net manufacture, etc.,

and in all these fields, skilled labour.

Whereas the industry can produce in a relatively short period the tools with which to implement the various stages of a development scheme, the training of men to handle the tools will usually take a longer time, depending on the knowledge and skills they require in operation. The need for training is clear, but it is not a simple matter of showing how a thing is done, but also why it is done and what results from it. When the trainees have to be drawn from the lower educational levels and where it concerns the introduction of new methods or the use of new gear requiring a certain amount of theoretical and practical "know-how", it is often difficult to recruit the right type of men to undergo such training. In fact, in underdeveloped countries with a high percentage of illiteracy such training can become a real problem, and the lack of it forms an obstacle to the development of an otherwise sound scheme. It is not always clear what amount of knowledge must be imparted during the training.

The subjects that should be taught are an easy choice, but it is difficult to decide how deeply these subjects must be gone into in order to prepare the trainee for his immediate tasks as the scheme develops.

A more difficult problem is to decide at which level to start; in other words, what may be assumed to be known by the trainees? This not only means what is their stock of knowledge, but also, how proficient are they at "learning", i.e., assimilating imparted knowledge? In nearly every case it is found that the time available for the course is much too short to allow a curriculum which includes everything the trainee should be "taught", so that there are always matters which have to be "lectured", "read" or even "scanned", and there is no way of knowing later, to what extent such matters were assimilated.

Is the Training of Fishermen Necessary?

The development of fishing gear and methods as we know them today in the Western countries started about the beginning of this century. Except for the last few years when scientists became interested in fisheries, this development is largely the result of piecemeal improvements and "hit-and-miss" experimental tactics carried out by the fishermen themselves so that they have "grown up" with the gear and the method. The change has, however, been so rapid that many young fishermen today would not know how to work the gear commonly known in his area only 30 years ago. Furthermore, due to school laws, all fishermen are

in most cases inefficient by modern standards. The fishermen are poor, mostly illiterate and by tradition have a low social status; the craft are small and even the best are half decked boats, the work is hard and conditions are rough while the earnings are hopelessly low. Under such conditions the fishermen's trade has no attraction for those who have enough education to find work elsewhere.

The gap between these two stages of development would take many years to bridge in the traditional "learn by experience" method; the training of individual crews by foreign experts is a slow method and limited in its scope, as such training is restricted to one crew and one locality. Training of groups, coming from different areas, is a much quicker way of spreading not only the technical knowledge, but also the information that other ways of fishing can be used by the local fishermen.

The Far Eastern countries present a different picture as there has been very little development of gear and method; the gear used today is the same as was used hundreds of years ago and literate and many with a very good education are attracted to the trade because of good earnings.

The Training Problem

Those concerned with education recognize several manners of imparting knowledge and a short summing up of the more generally known methods of teaching will perhaps make this more clear.

In kindergarden small children are "formed", and according to some

teachers even "reformed", as the children have to unlearn many of the habits they have already acquired. They are made accustomed to such social habits as cleanliness, obedience, respect, etc., but also to the need of making an effort to learn.

In primary school the children are "taught" by which is meant that lessons are explained to them and followed by exercises until the matter is fully understood. The tutor then sees to it that they do not forget, by periodical questioning, tasks and tests. He knows exactly what is in the children's stock of knowledge, and builds this up, one item at a time. Simultaneously he gradually accustoms them to "thinking" by the use of small problems, and so leads them to "study".

In high school the student is guided through his studies, the lessons (teaching) being interspread with lectures (statements on facts which he must study).

At University, the professors lecture and supply the knowledge on "a take it or leave it basis", and it is left to the student to assimilate this knowledge by his own method of study.

It is apparent that owing to the peculiar conditions prevailing at training courses, none of the above methods alone would be satisfactory nor applicable, either on educational or psychological grounds. In "training" one has to make use of several of these methods and in addition a liberal dose of human understanding if one wishes to obtain results.

All grades of education are intimately connected with psychology,

educators are very much like salesmen, as both want to transfer or sell something; for the first it is knowledge, for the second it may be a radio, but in both cases the clients' need for the article must be created, it must, therefore, be made attractive and worthwhile, and they must have the means to acquire it. In both cases "presentation" of the article is of prime importance. What is more, educator and salesman must be capable and persevering to bring their action to its logical conclusion: acceptance.

In the matter of training also, very much depends on the attitude of the instructor towards the trainees; his understanding of their general and particular difficulties; his approach to the various subjects to be taught; and above all his patience under trying conditions. The lower the educational level of the class, the more difficult the task of the master; this may seem paradoxical, but true nevertheless.

This paper concerns the "training of fishermen" as distinct from "training in fisheries" which is a different matter since the average educational level of the trainees differs very greatly. In underdeveloped countries the fishermen are mostly illiterate; assessed on educational merits alone they would often rate no higher than a second year primary schoolboy. He has, however, a stock of privately acquired knowledge, accumulated from experience and his own reasoning; he is normally intelligent if not "learned", usually has a remarkable memory and is quite accessible and receptive to knowledge, if presented the right way.

The last item is important. If a good choice has been made among the candidates for a course of training, the

trainees will be composed of young fishermen who command respect in their own milieu, and such men react strongly to slights or humiliation. The approach on technical subjects should never be: "what you know is wrong" whether this is true or not; it is far better to take the attitude: "you know something and I know something, let us compare and see what it adds up to". In fact, the author has found that the trainees themselves would often after a lesson spontaneously denounce what was wrong with their method. Incidentally, spontaneously finding what is wrong with their own procedure, is the best proof that they have understood what is right with your method and that the lesson was understood. Classroom technique cannot be discussed here but the most important factors involved with the teaching of illiterates, due to their lack of educational background, may perhaps be mentioned:

- a) The fisherman's working language is restricted, all words and terms used during lessons which are not in his vocabulary are a total loss. For the same reason the use of foreign terms and names must be restricted to the absolutely necessary and all new technical terms should be explained and repeated.
- b) Lecturing is useless. Their mind works argumentatively and questions every new fact, so that they cannot follow after the first few sentences due to the avalanche of new facts and the speed with which ideas are thrown at them.
- c) Sketches on blackboards must be drawn to proportion and each

line explained otherwise such sketches are as difficult to understand for them as handwriting is to small children. Whenever possible the drawing should be in perspective or at least figurative.

- d) Whenever possible consolidate by manual operation or exercise matters that have been explained and understood. For fishing methods instruction it is absolutely necessary that trainees are trained at sea under actual fishing conditions. The fisherman has probably more association possibilities in his hands than in his undeveloped thoughts.
- e) Fishermen are proud beings—use competition within the class to captivate and hold their interest.
- f) All abstract thinking is difficult for the untrained mind. In general it is easier for them to go from the whole to the part, i.e., with illiterates it is better to use the "breaking down" process than that of "building up" during lessons.

The above shows the importance that has to be attached to the choice of instructors for such centres. Their task is not easy and requires more than just technical knowledge; they must show interest in the work and have the personality to carry it through. Because of the responsibility attached to such work they must have more freedom to make decisions than is customary with other educational establishments.

Organization of Training Centers

During 1955-1957 the writer assisted in organizing four training centers for fishermen in India. These centers run a 6-months course for 20 trainees and have in general given very good results. The curriculum is adjusted to the requirements of the area in which they function, it includes a thorough study of fishing gear and methods, and embraces enough navigation to work distant grounds and practical instruction in engine maintenance. The following general approach to the establishment of fishermen's training centers is based on the experience gained at the centers in India.

A. Duration

In organizing a new training center one of the first matters that must be settled is that of its duration, as the extent of the subjects to be given depends on the time available.

Fishing is a seasonal trade and as each course should finish on a series of fishing trips under commercial conditions during which the lessons of the course are applied in practice, it is important that the course should close near the end of a fishing season. Furthermore, the training period must be so arranged that monsoon weather falls at the beginning of the course when the time can be spent in classroom and workshop tuition. This means that the opening and closing dates must also be chosen very carefully.

B. Location

Although the largest concentration of fishermen would appear to be the best place to organize a training center, it may not be the most logical place when looked at in the interests of the training and of future development. It is for

instance useless setting up a training center on a surf-bound coast just because many log catamarans operate there. No mechanized fishing will develop there without a harbor.

The following should be taken into account when making the choice for a training center site:

- i) there should be a harbor or anchorage, preferably open at all tides; with sufficient depth for small boat traffic;
- ii) the distance to the fishing grounds should not be too great;
- iii) the school buildings must be near the anchorage or harbor to avoid waste of time during training;
- iv) there should be possibilities of future development of fisheries in the area.

C. Curriculum

As stated above, the duration of the course determines the extent to which the various subjects of instruction can be gone into. It is clear that in the short time of six months (of which three months should be spent at sea), it is not possible to cover the whole field of gear technology, navigation, seamanship, first aid, etc., and expect results. However, because of the costs involved, 2 courses per year would appear to be the only acceptable terms at present. One must, therefore, make the most of the time available and divide it between the various subjects in proportion to their importance both to the fishermen and the area where the training center is located.

(i) Fishing Gear and Methods :

This is no doubt the most important subject, but so vast that not all gear

can be reviewed in detail. The best results were obtained by giving a general review of the most important ones; pointing out similarities and contrasts in construction and main advantages and disadvantages. The methods that would be most useful in the area are then explained in detail and operated out at sea.

(ii) **Materials:**

Owing to the advantages of the new synthetic materials, a good briefing on their use is, of course, essential. However, due to the high cost of synthetics and import difficulties in some countries, methods of preservation of the conventional fiber materials, especially those available locally, must also be gone into.

(iii) **Navigation:**

A good understanding of compass and log and practical use thereof should be aimed at and achieved. At the end of the course the trainees should be able to fix positions by cross bearings, on a chart, and plot their course home; be able to read the chart of their area and bring fishing grounds into it. Under this heading also comes the echo-sounder, of which they should get a generous briefing on its use and maintenance.

(iv) **Engines:**

Because of the shortage of time, description of parts should be kept to the minimum. The time available for this subject should be mainly devoted to teaching how the engine functions and to trouble shooting. Running and maintenance should be taught during the sea trips by putting the trainees in charge of the engine.

(v) **Seamanship:**

The Articles of the Road applicable to small craft, lights and fog signals

must be taught as well as harbor navigation if it applies to the area. Other seamanship depends on the standard of the class. If bona fide fishermen are enrolled it will be possible to pass over it lightly.

Other subjects such as first aid, fish handling, location, detection and attraction of fish, boat building, oceanography, must be dwelt on shortly during regular lessons and the main points rather brought forward during operations ashore and at sea.

Whatever the order given and the time allotted to these subjects, the officer in charge of the center should be free to alter them according to circumstances of training and the progress of the trainees. He should never be called upon to account for progress during the course, but rather be judged by the general proficiency of the trainees at the end of the course.

D. Training Facilities

Part of the training has to take place ashore and as this is done during the monsoon weather, sufficient rainproof accommodation space has to be provided. The following are the main requirements:

(i) **Hall for Practical Instruction:**

This should provide an open space of concrete floor of 60 by 40 ft., on which nets and other gear can be opened out during instruction. The same hall is used for netmaking and mending, for ropework and in general for seamanship classes. By fitting folding chart tables along the walls, the training in chartwork can also be conducted here.

(ii) **Mechanics Workshop:**

This should be a room of about 40 by 30 ft. for practical work on engines. It should be outfitted with enough engine spare parts for demonstration and if

possible with at least one small motor in running order. A good workbench with vise and sufficient tools to effect small repairs must, of course, be included.

(iii) Classroom:

One classroom will be enough for all lecturing purposes. It should be furnished with the usual classroom material such as benches, blackboard, etc.

(iv) Storeroom:

This must be provided with racks and rafters for storing the various items of gear such as nets and ropes.

(v) Boats:

To start with it is better to have two small boats rather than one larger vessel; this is more realistic as most of the craft in use in underdeveloped areas will probably remain of the open boat type for some time to come. The boats should be about 35 ft. in length, mechanized to give about 7 to 8 knots speed. They should be fitted for mechanized shooting and hauling of the gear, types that are most likely to be introduced in the area.

(vi) Gear:

No training in fisheries can be effected unless the tools of the trade are available. The center should therefore be supplied for the first course with such gear as will be used, in "ready for fishing" condition. After that only twine, rope and other material will be necessary as the gear will be constructed and assembled at the center by the trainees.

E. Trainees

The main element in all training is the person who is undergoing the training; the trainee. All the work that is done is for him and on him; he is

the reason for schoolbuildings, training boats, curriculae and instructors. But for him the instructors would not be there; when the personnel of a training center clearly understand this, their training will become successful, for they will then know that it is in their own interests to have successful trainees.

It would on the other hand be futile to expect results from a course of training unless the men undergoing that training are of the right type, or if the number is beyond that which can be given personal attention. With the present small training boats, a total of 20 trainees seems the most that can be handled. This provides a crew of 10 men for each boat, plus the instructors and in the available space this is more or less the limit. Theoretically it would appear best to start from scratch and enroll well-educated non-fishermen. The work at the training centers in India has shown clearly that this is unrealistic. Although such candidates make much better progress in all types of classwork, they lag far behind the fishermen in practical work. During sea training most of them are found to be practically useless owing to sea-sickness; they can't put up with the rough living conditions on small fishing boats even during fair weather and fail to stand up to the long hours of hard work.

By enrolling fishermen we have to face the fact that the average fishermen in underdeveloped countries is illiterate or very nearly so. He has however certain technical skills which are an asset and possesses the toughness and general disposition to stand the hard life at sea. Most important is that after training he will put into practice what he has learnt by staying in com-

mercial fishing. It was found that the non-fisherman trainees without exception went into shore jobs related to fishing, so that the time and money spent on their training was a total loss.

The trainees should therefore be chosen from among young fishermen between 18 and 30 years of age, with at least 5 years sea service. This will ensure that they are bonafide fishermen and eliminate all sea-sickness troubles during the training. The following could be used as criteria, in order of importance, for selection between such candidates:

- interest in improving their technical knowledge,
- intelligence,
- willingness and capability for hard work, and
- education.

Trainees belonging to several religious groups should be avoided in one class. It leads to accommodation problems and messing difficulties, both ashore and at sea.

Conclusion

At present, six training centers are functioning in India, two more

having been established in 1958 by FAO Expert, R. Ruppin. These establishments are each turning out 40 trained men per year. These men are not master fishermen nor are they fisheries technologists, but they have learnt much about fishing. They have been taught with what kind of gear fishermen work in other parts of the world and have operated themselves with some of those gear; they have experienced the advantages of mechanization of boats and have used hauling appliances during fishing operations which not only increased the efficiency and speed of the operation but at the same time made the work much lighter and made it possible to use more gear.

Most important perhaps is that they have learnt to think progressively about fishing and that what they have seen has convinced them that it is possible to improve on the method handed down to them by their ancestors. Not all will have derived full benefit, but those who have understood the lesson will be very useful for the development of fisheries in their country. They are the men who will help to bridge the gap.

C.A.B. BACK NUMBERS

The IPFC Secretariat receives a steady flow of requests for back numbers of the *Current Affairs Bulletin*.

If you have old issues or duplicates the Secretariat would be most grateful to receive them for distribution to other interested persons and institutions. Please send them to:

The Secretary
Indo-Pacific Fisheries Council
FAO Far East Regional Office
Phra Atit Road
Bangkok, Thailand

GENERAL TRENDS

Expansion of Marine Research in the United States *

The National Academy of Sciences—National Research Council has issued a statement making known the conclusions of a Committee which was set up at the request of a number of Government agencies to review the progress and needs of marine science in the U.S.A. The full report is promised in the near future. The main conclusions are encouraging because they show that many of the problems that have long been too large and perplexing to attract close attention are becoming more approachable and promising; they are also disturbing because they show that progress, though commendable, does not match growing needs for detailed information and understanding of the oceans.

The statement mentions the need for increased food supplies. The main factor leading to high fertility in the oceans is active mixing and upwelling from the deep layers, where nutrients are regenerated, to the illuminated surface layer where the plants grow. Upwelling is not confined to coastal regions, or to oceanic islands and shoals, and it can occur wherever there are sharp differences and changes in the surface and sub-surface currents. Such areas, far from land, are already forming the basis of ocean fisheries, and the factory ships that will fish them will need good understanding of the fundamental physics and biology as well as the breeding, feeding and migratory habits of the fish to ensure economical working with regular catches.

The need for more understanding of fluctuations and trends in climate is also emphasized. The heat capacity of the oceans is very much larger than that of the atmosphere, and the oceans are largely responsible for the thermostatic control that makes so much of the Earth habitable. They gather the Sun's heat and distribute it as moisture-laden air in a pattern determined by complex interaction between sea and air, currents and winds. The slow but powerful changes in the oceans have important effects on agriculture, fisheries, ice conditions and sea-level. All the great hurricanes and typhoons start over the sea.

Modern studies of waves, tides, currents and movements of sediments have much to offer to ship designers, coastal and harbor engineers, and to those concerned with special aspects of navigation, salvage and oil drilling. The National Academy Committee, however, gives special emphasis to the needs of military defence. With every fresh advance in surface, amphibious and undersea warfare, the side with the fullest knowledge and most detailed understanding of the oceans is likely to gain some advantage in devising new techniques, discarding out-of-date ones and judging how to proceed. The report mentions the submarine menace and maintains that "from the point of view of military operations there is no comparison between the urgencies of the problems of the oceans and those of outer space." Concern that the new fascination

* Reprinted from *Nature*, No. 4667, 11 April 1959, by kind permission of the Editor.

of space will divert American scientists and the Government from the vast unexplored regions and problems of the oceans is implied throughout the statement.

The study of the sea floor has made tremendous strides during the past five years. With the help of new tuning-fork controlled echo-sounders the floor of the deep ocean can be charted in nearly as much detail as a river estuary, and the half-inch to a mile maps, photographs, cores and dredges reveal fascinating new information about active movements of water and sediment, eroded channels, possible mineral resources and the habits of bottom-living animals. The time has come when geology can be actively extended to the rocks and sediments at the bottom of the oceans.

The main recommendations of the Committee are that basic research in marine science should be doubled within the next ten years, and that the research effort should be supplemented by ocean-wide surveys. The resources of the present surveying effort, mainly that of the U.S. Coast and Geodetic Survey, would be doubled for the purpose. The whole program would be strengthened by expanded application of the science to military defence, marine resources and the problems raised by the use of nuclear energy.

The first step towards the Committee's objective is the provision of new ships with the character of floating laboratories, and other for survey. The need for new devices such as submarines, mid-ocean platforms and unmanned buoys is emphasized, and new instruments and telemetering equipment are needed. It is estimated that each ship needs sixty shore-based scientists and technicians, and the difficulty of attracting men with

the essential skill and enthusiasm is clearly recognized as the greatest difficulty.

Oceanography is no longer a descriptive subject; some of its theoretical and practical work is as advanced, as difficult and as likely to find useful applications in other sciences, as that done in any research laboratory. The subject has begun to attract attention in universities, especially in the U.S.A., and the Committee feels that its difficulties may be surmounted by more deliberate measures to encourage interchange with universities. There can be no subject of wider and more rapidly growing interest or of more potential world value, and yet there is a shortage of qualified postgraduate research workers because the specialized facilities that might be used to continue university training are not used to the full, and the universities have few of their own. This problem will become more acute as the work in progress outside the universities requires increasing numbers of workers with more and more specialized qualifications; to solve it the Committee advocates affiliation of oceanographic research institutions with university faculties, and the development of new centers at universities.

The Committee proposes a ten-year plan costing 651 million dollars over and above the present level of expenditure. The plan is described as 'minimal' to meet long-range requirements, and it is stated that action on a scale appreciably less "will jeopardize the position of oceanography in the U.S.A. relative to the position of the science in other major nations, thereby accentuating serious military and political dangers, and placing the nation at a disadvantage in the future use of the resources of the sea".

The report has no official Government approval, but opinion in the U.S.A. expects it to guide the course of national support for marine science. Oceanographic research has already been earmarked by the President's Science Advisory Committee as one of the major scientific fields needing more emphasis. Further afield it is also of interest. From its very nature, oceanography is dependent on, and contributes to, most of the other sciences; moreover, its pursuit involves international collaboration on an extensive scale. Any increased support in the U.S.A. for oceanography will contribute to the development of the science and set an example which other countries might well follow.

Atomic Fishing Boat

Plans for building the first atomic-powered fishing vessel, for experimental purposes, were announced at the FAO Second World Fishing Boat Congress in Rome by Prof. Atsushi Takagi of the Department of Naval Architecture of the Institute of Tokyo. The vessel will have a displacement of 3,000-4,000 tons and will be powered with an American-type reactor. It will have a complement of one hundred, fifty of whom will be research experimenters. The reactor will be installed in a container and will use as fuel 29 percent condensed dioxidized uranium. For emergency use, a 120 h.p. Diesel will be installed.

Takagi said he believes that high speed fishing boats driven by reactors will be coming into general use before 1970. He also imagined that an atomic plant would enable the building of sub-surface fishing boats. Further, the development of electronics will be the means of introducing superior automatic

control systems. With such boats, he feels trawling may be conducted at any depth in the sea. (*National Fisherman*, May 1959).

Extending the Life of Salmon

The normal life cycle of salmon is to be born, go to sea, return after two or more years to the upper parts of streams and rivers, spawn and die. A few salmon have been known to return to the sea after spawning, and return and spawn two, three or four times.

Scientists of the Lancashire River Board, England, wondered if this mass death of salmon returning to sea was needless and if in fact deaths resulted only from sheer exhaustion and starvation. It is pointed out that once the salmon enters fresh water it stops eating. While fighting upstream, spawning and fighting back to the sea, the fish lives off its own body. This period usually lasts several months.

As an experiment, the Board sent men with nets through the upper reaches of England's spawning rivers as the salmon arrived in the fall of 1958. They caught 230 salmon, both male and female, put them in tank trucks and hauled them to a hatchery. There the eggs were stripped from the females, artificially fertilized by the males, and put into cool fresh water tanks for 100 days to hatch.

The adult fish were then put back into the tank trucks and hauled to the seaside at Morecambe. There they were put into fresh water tanks but sea water was admitted gradually in small doses until after five days the water matched that of the open sea.

Then the fish were transferred to the open air wading pool on the beach

and offered their normal sea diet, crustacea, eels and herring. Most started eating almost at once. New ovaries began to develop in some of the females.

The fish early in December 1958 were being tagged and given a few more days to recuperate. Then they were to be put into tanks and carried five miles or so offshore and turned loose. Experts hope many will come back next year.

So far the experiment has been satisfactory since few fish have died. (*Com. Fish. Rev.*, March 1959).

Helicopter Lifts Prawns

Helicopters may soon replace shrimp boats as a means of transport for prawns from the Rockhampton grounds off Queensland, Australia. Under a plan now being worked out, a helicopter will be sent round the prawn fleet in Keppel Bay to lift catches from the boats for immediate delivery to markets. The helicopter is expected to begin operations when prawn catching resumes in the Keppel Bay area. Hovering over trawlers, the helicopter will haul the baskets of prawns up from the boats on a winch powered cable and hook. The helicopter would also take supplies out to the prawn boats to enable them to stay at sea weeks at a time. (*Trade News*, March 1959).

Improved Pelagic Trawling Method

Promising catches of herring and sprat have been made with a new type of one-boat midwater trawl gear, consisting of a high opening nylon net, hydrofoil otter boards and an echo sounder oscillator attached to the headline of the net for continuous trawl depth indication and fish detection. This method has been perfected by Dr. J. Schärfe, gear technologist on the staff of the Fisheries

Division of the Food and Agriculture Organization (FAO), Rome. It is based on experimental work carried out by Dr. Schärfe when a member of the Institut für Netz-und Material-forschung, Hamburg. Dr. Shärfe was loaned by FAO to the Institute in December last to carry out midwater trawling experiments with a typical German North Sea cutter. These boats are about 24 m. overall, powered with 150 h.p. engines. When trawling in midwater, the cutters usually work in pairs, two boats towing one net between them. In Germany, there is also a rather primitive one-boat method using conventional otter boards which are kept at the desired depth by attaching them to big surface floats. Experiments were concentrated on improving the one-boat trawl. The main problem in midwater trawling has been to tow the net at the proper depth to catch the fish, and control the net so that it can be quickly raised or lowered as desired. The shorter the warps and the higher the towing speed, the higher the net will travel through the water. But this general rule applies only to a small degree to the one-boat trawl where the depth of the net has to be adjusted by changing the length of the strops connecting the otter boards with the surface. Furthermore, accurate adjustment of the net to the actual depth of the fish requires continuous indication of the depth of the net, so that the proper action can be taken in time.

The basic idea of Dr. Shärfe's method is not new. It consists of attaching an oscillator (transducer) to the net and connecting it by cable to the echo-sounding unit installed on board. An echo sounder oscillator attached to the bosom part of the headline to sound downwards indicates not only the depth of the net

but also the position of the footrope and the fish in the net-opening and below the net, as well as the sea bottom. This enables the fisherman to know the depth of the net, check if the gear is operating properly and to see if the fish in the path of the net are really caught. With some experience, he should be able to estimate the rate of catch and so determine the right time for hauling. These very obvious advantages make it much easier to accept the slight trouble of handling an extra cable. The experimental net had an opening height of 8 to 10 meters (27 ft. to 33 ft.) and, to improve its maneuverability, hydrofoil otter boards, designed by Mr. F. Süberkrüb, Humburg, were used. These provide a good sheer at a considerably lower drag as compared with the conventional boards. The warp is attached above the center of the board which gives an inward tilt, the lift varying with the towing speed. This increases considerably the influence of speed variations on the depth of the net, and enables the skipper to regulate the depth through engine control.

This new gear combination enables the skipper to practice 'aimed' fishing in what has hitherto been mostly a blind operation. The skipper of the cutter chartered for the experiments was soon able to handle the gear and, since the experiments, has successfully fished with it on a commercial scale. He has often caught the same amount, or even more, than have the pair-trawl boats fishing nearby. German deep sea trawler companies are very interested in midwater trawling for herring, particularly as an additional method for craft of 400 to 500 BRT and 600 to 800 h.p., which are not suitable for fishing on the distant grounds off Greenland, Newfoundland and Labrador.

As a result of the promising results of the cutter experiment, this type of gear was also tested with a medium-sized deep sea trawler. The experiments were carried out with a steam trawler of 400 BRT and 600 h.p. in the northern North Sea during February 1959. A very big and light nylon trawl was made which worked with an opening height of 12 to 14 m. Basically the same echo sounder oscillator arrangement was used but with an automatic electric winch essential for handling the 400 fathom cable needed for fishing at about 110 fathoms. The method proved to be applicable for these bigger craft and valuable experience was gained for future improvements. Catches of up to $3\frac{1}{2}$ tons of herring per haul were made which were considered fairly good in view of the limited size and density of the schools present.

An interesting innovation was tested during these trials, that of an oscillator on the trawl headline transmitting concurrently up to the surface and down to the bottom. This gives the skipper much better information on the actual trawl depth. Irregularities of the bottom profile may be mistaken for net movements and vice versa but the indication of the trawl's distance from the surface eliminates this difficulty completely.

The result of these experiments, financed by the German Ministry of Agriculture on the request of the German fishing industry, is a big step forward in improving the technique of commercial midwater trawling.

It is likely that this method of "aimed" trawling may lead to exploiting pelagic fish resources which have not been, or only to a limited extent, fished so far.

Growth Rate of *Tilapia*

Recent experiments with *Tilapia* at the Commonwealth Fish Culture Research Station, Batu Berendam, Malacca, have yielded extremely interesting results.

Carefully controlled experiments using marked fish have demonstrated that the female *Tilapia* show a marked decline in growth rate after attaining a length of about 22 cm. whereas the growth rate of the males appears to continue at a much higher rate.

Experiments in hybridization of Malayan *Tilapia* with imported African fish of the *Mossambica* group but a different species have produced fish with a growth rate considerably greater than that of either of parent.

The report contains the following summaries of results:—

“The results of marking *Tilapia* fish by fin-cutting and by attaching numbered discs are described.

As far as the fin-cutting method is concerned, the dorsal fin regenerates less rapidly than the pelvic fins, and is therefore the best fin to mark. The marked fish appeared not to be handicapped in their growth rate as compared with unmarked controls or fish with regenerated fins.

Marking experiments with numbered discs showed:—

- (a) that female *Tilapia mossambica* may reach a length of 23-25 cm., and a weight of 200-250 g., in a period of 200 days, without supplementary feeding;
- (b) that Malayan *Tilapia mossambica* males grow faster than imported *Tilapia* males from East Africa, though the reverse is the case with the females;

- (c) but that the cross between African male, and Malayan female fish grew more than twice as fast as either parent stock.” (*The Malayan Agricultural Journal*, Vol. 42, No. 1, 1959).

Electrofishing Cannon

Electrofishing equipment has been installed on a Moroccan sardine vessel. Electrofishing consists of emitting electrical currents of certain intensities in the water which attract fish and deprives them of all reflexes for about 2-3 minutes, time needed to capture them either by a suction pump or by net. The Moroccan vessel is equipped with a suction pump and a “cannon”.

The suction pump has a rubber tube 10 in. in diameter and lowered down to 243 ft. which picks up the fish attracted by an anode located at the end of the tube.

The cannon is a device for shooting an electrode, attached to a floating cable, for a distance up to 328 ft. into the middle of a surface school of fish. When the electrode hits the water, the vessel's generator starts transmitting an electrical impulse.

In less than a second, the fish are gathered around the electrode within a radius of 33 ft. The vessel then approaches the fish and hauls them in by suction or by net. (*National Fisherman*, March 1959).

Catching Herring by Air Bubbles

It is reported that experiments conducted by the U.S. Fish & Wildlife Service have shown that it is possible to increase catch of herring by use of air bubbles. A curtain of air bubbles will

concentrate the fish around this curtain and the fish can be taken by conventional methods such as purse seine. The equipment used in the tests consisted mainly of 1,200 ft. length of polyethylene plastic flexible pipe, with holes drilled at 1-ft. intervals. Air is supplied from two compressors, one at each end of the pipe. The polyethylene pipe is weighed with lead to make it sink. Further tests have shown that much longer pipe with smaller holes e.g. $\frac{1}{64}$ in. diameter could be used. The pressures used may be up to 100 pounds/sq. in. (*National Fisherman*, May 1959).

Preservation of Mollusks Specimens

Propylene phenoxytol (Nipa Laboratories, Tregorest, Pontypridd, Glamorgan, U.K.) forms a very satisfactory preservative when prepared as 1% aqueous solution with glycerol.

It may be used as a narcotizing agent, in which case the chemical is added gently to the water, in which the specimens are immersed, so that it forms a large globule on the bottom of the container. Not more than 1% of the volume of the water is required. The specimens remain in this mixture overnight and are then fixed in 10% formalin for 4-24 hours depending on the size of the specimens.

After proper fixation, the specimens are carefully washed and transferred to 1% propylene phenoxytol in 5-10% aqueous glycerol.

Processing in this manner tends to eliminate distortion of the external appendages and internal diagnostic organs. "*Helix pomatia*", after more than two years in the preserving fluid have proved excellent for class dissection and the

equal of freshly killed animals". (Owen G. and H.E. Steedman, *Preservation of Molluscs. Proceedings of the Malacological Society of London*, Vol. 33, pp. 101-103, 1958).

Fish Flour for Human Consumption

A method in which minced fish flesh is fermented in the presence of defatted butter milk has been worked out. The fermented fish flesh is subsequently treated in the same manner as in reduction process. The method is found to be particularly suited to Elasmobranch fishes where the body oil content is very low and the removal of the high flesh urea content presents a major problem. Fermentation is found to result in the almost complete removal of urea and partial deodorization. The extra cost involved in the fermentation is almost negligible. Further, the major disadvantages of the solvent extraction process, viz. high cost of production, toxic effect of traces of solvent remaining in the product, etc., are overcome in the fermentation process.

Investigation on the keeping quality of the fish flour under ordinary conditions of storage showed that the products remain in very good condition for over 18 months. There is a certain amount of 'flavor reversion' during this period, but not enough to impart fish flavor to food preparations when quantities upto 15% by weight of the flour are used.

Percentages upto 20% by weight of fish flour prepared from shark and skate flesh by the fermentation process have been tried in food preparation without producing any fishy flavor. (*Indian Fisheries Bulletin*, July 1958).

Aerial Echo-Sounding and Fish Location

Using a combination of an ultrasonic depth recorder, a streamlined float, and a helicopter, Russian scientists have developed an efficient method for locating schools of herring, anchovies and the larger tunny or horse mackerel. The aerial ultrasonic sounding method has proved to be faster and more accurate than have either visual or acoustical surveys made with instruments located aboard a fishing vessel.

The aerial-acoustical method is quite simple. The helicopter is made to hover approximately 50 feet above the water level of the area being surveyed for fish. The sound projector, or microphone, is lowered into the water on a wire. Thirteen to twenty feet above the microphone, a buoyant streamlined float is attached by wire. The wire from the float leads up to the helicopter, where it is wound on the drum of a small winch with its terminal attached to the acoustical depth-sounding instrument. The float and microphone are towed over the area at speeds that range up to 10 miles per hour while a technician at the instrument panel watches the tracings sent up from the microphone and recorded on tape. The velocity of the ultrasonic signals indicates (1) the dimensions of the fish schools, (2) their depths, and (3) the species of fish in the school.

Using a radiotelephone, the technician relays the information to fishing boats in the area. In addition to guiding the boats to the schools of fish, the information tells the fisherman the amount and type of fish below the surface and thus enables him to prepare

the proper trawl or seine gear for the fish he expects to catch.

Several advantages are reported for this type of fish finding: (1) the helicopter can cover the fishing area much faster than can a patrol boat; (2) the fish are not frightened, as they might be by depth recordings taken by a patrol boat; and (3) the helicopter is able to operate over rough water that would both slow up a patrol boat and make depth recordings taken from it inaccurate.

This aerial-acoustical method is being used to locate herring in the Caspian Sea, cod and herring in the Barents Sea and in Far Eastern waters, and the anchovies, sprat, scad, and horse mackerel in the Black and Azov Seas. The method is particularly successful during fall and winter months, when herring and anchovies form large schools along the shores of the Crimea and the Caucasus. (*Commercial Fisheries Abstracts*, May 1959).

U.S.A. Authorizes Use of Antibiotics for Fish Preservation

The use of an antibiotic to aid in keeping fresh-caught fish in sound condition has been authorized for the first time by the U.S. Food and Drug Administration (FDA) in an order setting a safe limit on the amount that may remain in these foods without harm to the consumer.

The FDA order allows commercial fishermen to use an antibiotic known as chlorotetracycline on fresh-caught whole, headed and gutted fish, shucked scallops, and unpeeled shrimp. It does not allow use of the antibiotic on processed seafood products, including fish cuts, steaks and fillets, peeled shrimp, and shucked

oysters. FDA pointed out that chlorotetracycline has been used on uncooked poultry since 1955 and extensive data on its safety are available.

A minute amount will remain in fresh seafood treated with the antibiotic and will not always be removed in cooking, the agency said. FDA scientists and physicians have determined from all available data and feeding tests that this amount of chlorotetracycline can be consumed without harm, even to the very few exceptional persons who may have developed a sensitivity to antibiotics.

The law requires the label of treated seafood products to show the fish contains chlorotetracycline and that it has a preservative effect, FDA said.

Commercial fishermen will use the antibiotic as a dip or in the ice as an aid to keeping their catch in sound condition. They may not use the antibiotic in place of adequate refrigeration, nor, because of its use, neglect to maintain thoroughly clean conditions aboard their boats for assurance of clean, wholesome seafoods, FDA emphasized.

The FDA order sets 5 parts per million as the maximum amount of chlorotetracycline that may legally remain on fresh-caught, unprocessed seafood. The FDA action was taken in response to a petition by American Cyanamid Company, New York City. (*National Fisherman*, May 1959).

Fish Culture and Sewage

A study of the physicochemical properties of raw sewage of the city of Calcutta for a period of one year and determination of the ranges of variations of different physicochemical factors have shown that the inimical effect of raw

sewage on fish life has been found to be due to the presence of CO_2 , H_2S , NH_3 and suspended solids in high concentration, while its potential as a fish-pond fertilizer is due to its high phosphate and available nitrogen contents as well as its high alkalinity. Before introduction of sewage water into any fishery, dilution of the same by freshwater should be so effected that a positive dissolved oxygen balance is maintained (oxygen consumption value below 20 p.p.m.) and the concentration of inimical ingredients brought down to below lethal limits. Introduction of raw sewage even by judicious regulation of doses raises the bed-level of the fishery and the toxic zone so created may cover the entire fishery in due course endangering fish life. (*Indian Fisheries Bulletin*, Oct. 1958).

Narcotizing Small Trout during Transport

During July 1958 trials were carried out in the U.S.A. with tricaine methanesulfonate (M.S. 222) to narcotize small trout and reduce the water-to-fish ratio in the transport of the fry.

In the first trial, 20 cutthroat trout (1,200 lb.) were put in each of 5 plastic bags (8 by 4 by 16 in.) with 200 ml. of M.S. 222 in a concentration of 1:20,000, 1:40,000, 1:60,000, 1:80,000 or 1:120,000. The air in each bag was then replaced with oxygen. When they had been closed with rubber bands, the bags were put into a 5-gal. pack-can with 4 or 5 lb. of ice. After a 5-hrs trip to the lake, the fish were released in corrals of fine netting in shallow water. Fish still immobilized an hour later were rated as mortalities. The 1:20,000 concentration resulted in 95 percent mortality; other concentrations gave little difference in

survival. Fish in the heavier concentrations took longer to recover, but all fish recovered in good shape from concentrations of 1:40,000 and less.

In another trial 6 ml. of the 1:40,000 solution per gram of fish (equivalent to 2.5 quarts of water per lb. of fish or $\frac{1}{8}$ th of the weight of water usually carried) was used.

Into each of four 1-quart plastic food containers of the type used in freezers, 5,000 ml. of a 1:40,000 concentration of M.S. 222 was poured. About 5,000 cutthroat trout (3,000 lb.) were put in each container, which was then closed tight with a friction-type cover. Oxygen was not used. The containers (each about half full) were put into an insulated "picnic bag" with about 3 lb. of ice, and the bag was placed in a pack-sack.

Three hours later the fish were released in the lake after some temperature adjustment. An hour later 19 inactive fish were rated as mortalities; the rest of the 20,000 fish could be seen feeding in the shallows 100 yards in each direction from the release point. (*The Progressive Fish-Culturist*, Vol. 21, No. 2, 1959).

Lobster Hearts used for Study of Drug Action

Spiny lobster hearts may provide scientists with a new tool for studying

the action of drugs. The lobster heart, which contains nine nerve cells, appears to be a near-perfect model that permits the study not only of a single nerve cell in action, but its inter-action with other heart nerve cells.

It is for this reason the spiny lobster heart might prove very useful to research workers for watching what happens when drugs, such as curare or barbiturates, reach a neuron. The effect of a drug on a lobster heart could illustrate a possible effect the same drug might have on human nerve cells.

There should be no difficulty in getting the hearts for research purposes as this bountiful clawless lobster is a delicacy and only its tail is used as food.

A study is being made at the Bermuda Biological Station, of the heart's nerve cells as well as the function of the lobster's pericardial organ. This organ is responsible for the release of a very powerful chemical stimulator for the lobster heart.

If it could be discovered how this material is released, it could provide a clue to the release mechanism of certain hormones in humans. Science would then have another piece to fit into the jigsaw puzzle of how the human chemical factory works. (*Science News Letter*, 6 September 1958).

NEWS FROM MEMBER GOVERNMENTS

AUSTRALIA

The Annual Report for 1958-59 of the CSIRO Division of Fisheries and Oceanography gives the following information:

The Division of Fisheries and Oceanography is mainly concerned with the study of the fisheries resources of Australia, including whales, more important commercial species of fish and shellfish. The Headquarters of the Division is situated at Cronulla, 20 miles from Sydney. New biochemical and hydrological laboratories and aquarium tanks for the fish behavior laboratory have been constructed. A new steel research vessel, which is to be equipped with modern fish-finding and navigation equipment, is being constructed. This vessel will conduct research on barracouta. The fisheries research vessel DERWENT HUNTER which was formerly used for oceanographic work will now be used for tuna research in south-east Australian waters. Oceanographical research will be carried out from two frigates of the Royal Australian Navy. The report gives an account of investigations in the field of oceanography fisheries and marine fouling. The subject of study in oceanography include physical oceanography, hydrology, zooplankton, phytoplankton, productivity, biochemistry and bacteriology. The fisheries investigations include whales, marine fish, estuarine fish, fresh water fish, fish behavior studies, taxonomy and embryology, crustacea and other shellfish.

There is a list of some 46 publications of the Division during this period.

Reaction to Russian Whaling Fleet Expansion

Plans made by the Soviet Union to build 4 or 5 large factoryships to participate in whaling could seriously endanger Australia's whale stocks, according to the Commonwealth Director of Fisheries and Australian representative on the International Whaling Commission. He stated that any breach of the International Whaling Agreement could lead to unrestricted taking of whales in the Indian and Pacific Ocean. If Russia began to catch whales faster than anyone else, other countries would find it uneconomic to compete. The whole tendency will be to break the international agreement. This will mean that whaling in Australian waters will be finished in a few seasons. Australia is a signatory of the International Whaling Agreement and has not indicated any intention of withdrawing from it. However, the whaling industry is well-established both on the west and east coasts of Australia and the Australian government may have to consider taking steps to protect it.

Whale Steaks for Animal Food

A Sydney firm is offering one-pound packaged whale steaks for animal food at about 14 U.S. cents a package delivered to retail stores in refrigerated trucks for display in the retailers' cabinets. The whale steaks are resold at a retail price of about 18.7 U.S. cents a pound to yield a profit of about 33 percent. (*Australian Fish Trades Review*, November 1958).

BURMA

Deep Seafishing in Burma 13 pp., illus., printed. Martaban Co., Ltd., 49/53 Phayre St., Rangoon, Burma, January 1958: A report of the Burma-Japan deep sea fishing joint venture, formed in August 1953 under the name of Martaban Co., Ltd. The venture, under the guidance of the Ministries of Industries, and Agriculture and Forest, has as its aims, among others, the development of

self-sufficiency in marine foodstuffs and the establishment of subsidiary industries such as fish meal and fertilizer. Several charts showing the location of the fishing grounds and tables on the performance of the Company's trawlers are included. The authors conclude that sea fish is beginning to assert itself into the diet of the Burmese people. (*Com. Fish. Rev.*, March 1959).

CEYLON

The Extension Service Newsletter No. 14 dated 30 June 1959 of the Fisheries Department, Ceylon gives the following information.

Mechanization

The progress of mechanization has been very satisfactory. Since last April, 21 more mechanized boats have been launched. Of this 2 have been bought out of private funds while 19 have been purchased out of Government loans. In addition, twenty nine indigenous craft ("oru" and "theppam") have been mechanized by the installation of out-board motors. Some of the mechanized fishing boats that were fishing in the West Coast during the last fishing seasons have migrated to the East Coast with the setting in of the South West Monsoon. Seventeen boats from the Negombo area continue to operate from Negombo and are engaged in tuna longline fishing. Catches brought in by these boats have been good. During this period last year the mechanized boats of Negombo were engaged only in trolling, as the fishermen were of opinion that it was not safe to engage in deep sea tuna longline fishing.

Nylon Nets and Fish Spoilage

Complaints have been received that nylon gillnets cause decomposition of the fish caught in them. From inquiries in the Negombo area, it has been found that fish caught in nylon nets decompose because of the long intervals that elapse between collections of fish from these nets. Nylon nets do not have to be dried regularly and are left in the sea for several days. Fish caught in the nets are removed from the nets at the fishermen's convenience. The quality of the fish caught in nylon nets has been good when the fish is collected after 6 hours. But it has been found that overnight catches (i.e. where collection is made only after 12 hours) contain a high proportion of decomposed fish. From investigations made by the Department it appears that the decomposition of fish caught in gill nets depends on the type of fish and length of time that the catch remains in the water after death *and not on the material of the net*. *Nylon net fishermen are advised to collect their catches at short intervals of time, say within 6 hours.*

Nylon Fishing Nets, Twine and Kuralon Rope

The Ceylon Cooperative Fish Sales Union has imported a stock of nylon fishing nets, twine and Kuralon rope from Japan for sale to fishermen. Fishermen's Cooperative Societies and recognized Fishermen's Study Circles will be given a discount of 5% on the prices

given below. The Union will also sell to individual fishermen who bring a certificate from the Fisheries Inspector of the area certifying that the intended purchaser is actually engaged in fishing and that this gear is necessary for his fishing operations. The certificate should also state the quantity of each article required. The prices of the materials are given below.

- | | | |
|---------------------------------|--|---------------------|
| 1. <i>Nylon fishing nets</i> | — 6 in. stretched mesh,
natural white, 50 meshes deep, 500 meshes
long, double selvaged 210D/30/Z3 double
English knot 16.55 lb. per piece. | Rs. 185.00 |
| 2. <i>Nylon fishing nets</i> | — 6 in. stretched mesh
natural white 50 meshes deep, 500 meshes long,
double selvaged 210D/27/Z3 double English
knot about 14.82 lb. per piece. | Rs. 170.00 |
| 3. <i>Nylon Twine</i> | — 210D/30/Z3 natural white | Rs. 9.85 per lb. |
| 4. <i>Nylon Twine</i> | — 210D/27/Z3 natural white | Rs. 9.25 per lb. |
| 5. <i>Kuralon Rope</i> | — 6 mm. diameter 205/50 x 3 x 3
one coil about 117.6 fathoms. | Rs. 101.00 per coil |
| 6. <i>Nylon Twine for selva</i> | — 210D/60/Z3 natural white | Rs. 8.50 per lb. |

Engine Maintenance Course

A one-week training course in the operation and maintenance of Diesel engines was held at the Fisheries Factory, Mutwal from 20-25 April 1959. The course was conducted by Mr. E.R. Kvaran, FAO Marine Engineering Superintendent, assisted by the Headquarters Extension Officer. Twenty-four trainees from the area stretching from Tangalle, 126 miles south of Colombo, to Kalpitiya, 100 miles north of Colombo attended the course. Instructions were given for six hours daily. It was felt that one week was too much. It was difficult to get fishermen to leave their homes for a longer period, entailing as it does both considerable expense as well as loss of income for the fishermen.

Pearl Oyster Fishery

Surveys of the pearl banks have been carried out annually since 1955 and they have revealed the presence of a good stock of oysters on most of the well known Paars which were expected to mature during different periods. A fishery was held last year on a patch that was mature and about 4½ million oysters were fished. The size of oysters fished (average 70 mm.) compares with the size of oysters fished off Tuticorin by the Department of Fisheries, Madras, last year which were of the same average size. Two more surveys were carried out since the last fishery. The results show good prospects of two big fisheries in 1960 and 1961. Preparations are being made for these fisheries at the

moment. About 25 million oysters are expected to be mature next year. With a view to mechanizing the process of extraction of pearls and to overcome many problems associated with the disposal of such a large quantity of oysters, various methods were tried out in the departmental laboratories. It was found that the best method would be to rot the oysters and then to wash them

mechanically. Equipment was designed for this purpose and trials were carried out at Silvathurai early this year. The results have been satisfactory. It is proposed to extract and seal the pearls without grading entirely by mechanical means and to put up the sealed bags for auction so that buyers will not have to face the difficult problem of extracting the pearls from the oysters.

FEDERATION OF MALAYA

The Quarterly Progress Report of the Fisheries Department of the Federation of Malaya for the Second Quarter of 1959 (April-June 1959) gives the following information :

Fish landings in all parts of Malaya except Penang, Selangor and Negri Sembilan have improved since the first quarter of the year. This improvement is to be expected on the East Coast following the period of the North East Monsoon but is not always the case in this season in Kedah, Perlis and Perak where very heavy landings are recorded. In Perak the landings were particularly heavy at Pangkor in May and June which overtaxed the capacity of the country to absorb the production and resulted in the serious economic situation there. When the figures for the quarter are compared with those for the corresponding quarter in 1958 it may be seen that the 2nd quarter of 1959 has been a much more rewarding period for the fishermen in the North West and South East Zones, but has been a less productive period for the South West. Due to poor fishing conditions the catches in the North East have been maintained at only about the same level as in 1958. The large nets such as the

tangkol, which landed much of the fish in the South East, failed in the North East, reportedly due to strong currents and clear water.

Mechanization

A total of 307 boats were fitted with engines between April and June 1959. Of these 180 were inboard Diesels and 127 outboard engines. The high rate of mechanization is being maintained in South Selangor where 82 Diesels and 11 outboards were fitted. Following the North East monsoon 52 Diesels were fitted in Trengganu. In North West Malaya outboards are still more popular than Diesels and in this area a total of 73 outboards were fitted as against 14 Diesels. Although only eight new Diesel-engined boats were completed in Pahang during the quarter, this is the highest number so far turned out in any quarter and is therefore noteworthy.

Fresh Water Fisheries

During the period under review a total of 23,465 fish fry of various species were distributed to all parts of the Federation. The total was made up as follows :

Lampam jawa	8,076
Lee Koh	3,080
<i>Tilapia</i>	5,689
Kalui	420
Sepat siam	6,200

A considerable proportion of the fry were supplied to ponds in Pahang and Trengganu which have been completed for some time but for which supplies of fry were not available.

The clearing and restocking of mining pools has continued. Eight pools with a total of 15.94 acres were cleared with piscicide. In Perak, several pools which were cleared and stocked by the Department are yielding regular catches and, following the Department's lead, many people are applying for T.O.Ls. for land containing mining pools which the applicants wish to turn into fish ponds.

Three short training courses for fish-pond owners have been held in which trainees from Perak, Kedah, Kelantan and Trengganu were given a grounding in the correct procedure for successful pond-farming. The effect of the training has been clearly demonstrated by the improvement in the size and construction of fish ponds in Kedah which are run by ex-trainees.

With the arrival of Dr. S.W. Ling, United Nations expert, the problem of giving the Fisheries Department fresh water staff thorough training in modern technique in the field has now been tackled. An extensive course of training in all aspects of fresh water fisheries work has started in June, which all the fresh water field staff are attending.

Work in the new Fry Breeding and Distribution Station at Kuala Kangsar is well under way. The office and quarters have been completed apart from some minor works and the ponds are under construction.

Fishermen's Cooperatives

The operation of collective marketing of fish on the East Coast continued during the quarter. From South Trengganu 543.22 piculs of wet fish and 457.66 piculs of dried fish were marketed through appointed wholesalers in Kuantan. In the North-East approximately 2,280 piculs of wet fish passed through the collecting center at Sebrang Takir for Kota Bharu.

Repayment of loans is proceeding slowly due to catches and returns being less than expected. The general position regarding loans cannot be regarded as satisfactory.

The East Coast Transport and Marketing Union took over the Kelantan Ice Works in order to enable its members to obtain cheaper ice supplies and to let them share in the profits to be made in ice-production.

The Hengwha Cooperative Society at Malacca has almost completed negotiations for construction of its ice-plant in Malacca.

Cockle Industry

In April in Lower Perak 840 licences were issued for cockle collection and approximately 10,000 tins of seed were collected. The total seed collection from the Gula-Kuala Kurau spatfall was approximately 24,000 tins.

At Kuala Sg. Rengit, Johore cockles were harvested following sowing of seed there in 1958. The results were not encouraging due to the area being subject to the effects of rough weather which killed off many of the young cockles.

In the Beting Kepah and Kuala Selangor areas a spatfall occurred. A considerable amount of the seed was taken by Perak cultivators for sowing on their beds.

The high returns from cockle production are fully appreciated by the people on the West Coast and cockle seed is in great demand.

Experiment

Under the direction of Mr. Momokawa, Colombo Plan Fishing Expert, M.V. KEMBONG has been used for fishing experiments involving the use of longlines for bottom fishing in the area between Penang and Langkawi and to the West. Various modifications are being made to the gears to suit local conditions and local fishes and the localities under which different species of fish are to be caught are being determined.

Plans are being finalized for construction of a set-net based on the Japanese Otoshi-ami but specially adapted to suit local conditions. One model has already been examined and the construction of another, incorporating various modifications, is under way. Should the net prove successful, it is possible that it may take the place of the large fishing stakes which constitute such a serious problem in Malayan fisheries.

Fisheries School

The Second Fishermen's Training Course for 1959 started on April 13th and ended on 26th June. Nineteen trainees from various parts of Malaya attended. In addition to the normal instruction on navigation and engine repairs, the trainees were given lectures on general aspects of the fishing industry and on different types of fishing gears and were taken to sea for practical training in handling of fishing gear.

The Junior Technical Instructor left Malaya on 10th April 1959 on a 3 month study-course in Japan made possi-

ble by facilities provided by the Yanmar Diesel Engine Co. Ltd., Japan. In spite of the added burden thrown on to the remaining staff by his absence, the examination results were very satisfactory.

The Marine Department have now sufficient staff to undertake examinations for Helmsman's Certificates and the trainees are again taking the examination.

Of 19 trainees, 17 passed the Departmental Examination in Navigation and 15 the Department Examination in Engine Care and Maintenance. 14 trainees sat for their Engine Driver's Certificate and all passed. 8 sat for Helmsman's Certificate and five passed.

Research

The research program of the Department is now well defined and the work is mainly survey, routine sampling and analysis. Routine examinations of cockles and their environment have continued. In the *Rastrelliger* (Kembong) investigations, a sampling procedure has been established and data are being collected on

- (a) Length frequency measurements
- (b) Gonad condition
- (c) Plankton
- (d) Hydrology.

Analysis of water samples from a number of ponds at Bayan Lepas is being carried out to examine the relation of plankton abundance to fluctuations in the chemical content of the water.

Fish Spawning by Pituitary Extract Injections

The program of fresh water fisheries development initiated by the Ministry of Agriculture in 1957 with the establish-

ment of a cadre of fresh water Extension staff has made gratifying progress. Apart from imparting advice on the ground, to date, 121 ponds and mining pools of a total area of 214 acres have been cleared of predatory fishes, and restocked with the following fishes—*Tilapia*, common carp, Kalui and Lampam Jawa (*Puntius javanicus*).

The Fisheries Department is now faced with an increasing demand for the supply of Lampam Jawa fry from fish farmers all over the country. Unlike the Chinese carps which find a market only with the Chinese, Lampam Jawa has a much wider appeal and is particularly esteemed by the Malay section of the population because it is a close cousin to the popular local ikan Lampam. Even the aborigines in Bentong have taken to rearing Lampam Jawa in ponds.

By using traditional method, natural spawning of this fish has been successfully done by two fish farmers—a Malay at Baling and a Chinese at Ipoh, and also by the Fisheries Department at the Tapah Fisheries Station. However, the degree of success of natural spawning by traditional method is not predictable and even if successful, the survival rate of the eggs and young is usually low. For this reason it has always been the aim of the Department of Fisheries to seek improved methods of spawning good pond-fishes.

The Ministry of Agriculture has therefore great pleasure in announcing that an important milestone on the development of fresh water fisheries in Malaya has just been reached. The Lampam Jawa has been successfully induced to spawn in large numbers by the application of injection of fish pituitary gland. This is the first time such a method has ever been successfully applied in Malaya,

and it is also the first world record as far as Lampam Jawa is concerned.

The work is done at the Federal Fisheries Station at Tapah under the technical direction of Dr. Shao-wen Ling, one of the world leading authorities on fishculture, who has been assigned by the FAO, under the UN Technical Assistance Program, as Adviser to the Ministry of Agriculture on problems concerning fishculture development in Malaya.

Dr. Ling reported that all the fish specimens used for this work were taken from the ponds of the Tapah Station, and one of three existing aquaria (about 3 ft. x 8 ft. x 3 ft. in size) of the Station was used as a spawning tank. The pituitary glands were taken from Lampam Jawa, prepared into emulsion and injected into fully matured female Lampam Jawa.

Injected females and uninjected males were introduced into the spawning tank at about 4.00 p.m. and spawning took place around 4.00 a.m. the very next morning. From the two injected females the number of eggs produced has been roughly estimated to be in the order of 1/5 million, and a very high percentage of them were well fertilized. The eggs developed very fast and young larvae started hatching out in only about 16 hours after spawning.

The fisheries officers working under Dr. Ling's technical supervision are now being trained by him on this new technique, and large scale production of fry and fingerlings of this fish will soon be expected.

Arrangements are now being made for Dr. Ling to continue similar experiments with other kinds of important fish that have possibilities for extensive culturing in Malaya, such as:— Ikan Tenggalan, Ikan Temoleh and others. (*Straits Echo and Times of Malaya*, 1 August 1959).

FRANCE AND UNITED KINGDOM

NEW HEBRIDES

Tuna Industry Aids Economy

The only significant economic advance made during 1958 in the New Hebrides was the opening of a fish cannery at Santos. Frozen tuna valued at £St.382,156 (about US\$964,000) accounted for the major portion of the increase of exports from the Condominium in 1958. The cannery, in operation most of the year, proved to be an excellent source of

overseas earnings for the Territory and is one of the few important and successful industrial or commercial developments in the South Pacific area in recent years.

In 1958 the New Hebrides exported 3,509 metric tons of frozen fish (valued at US\$964,000) and imported 210 tons of canned fish valued at about US\$69,400. (*Comm. Fish. Rev.*, June 1959).

INDIA

Fisheries of Kerala State**Improvement of Craft**

Pablo type boats of two dimensions, viz., 24 ft. 7 in. in length and fitted with 10 h.p. engines and 31 ft. 9 in. in length and fitted with 30 h.p. engines were designed by FAO Naval Architect, Mr. Paul Zeiner, originally. This type has been found to be quite suitable for various methods of fishing, such as shrimp trawling, gillnetting, drift-netting and hook and line fishing. Due consideration has also been given while designing, to make the construction as cheap as possible.

Another FAO Naval Architect, Mr. Peter Gurtner, has designed recently three types, viz., a 25ft. and 30-ft. boats and a 32-ft. transom stern trawler. Of these, 25 ft. boats are to be fitted with 10 h.p. engines and the other two types 30-40 h.p. engines. The first two types of boats have been constructed and on trials they were found to give very satisfactory results in experimental stage. These types designed by Mr. Gurtner are more sturdy in construction, but they are more costly than

Pablo-type boats. The local indigenous crafts are not suitable for mechanization and hence new designs had to be evolved. A boatbuilding yard and workshop is now being constructed at Vizhinjam and construction of fishing boats as per the new designs will be taken up here.

Though mechanized boats are now getting more and more popular among fishermen, the fishing has not yet been fully mechanized due to want of proper deck gear such as winches, gurdies, etc. Experiments on improvement and preservation of gear are being carried out at Central Fisheries Technological Research Station, Cochin. Nylon twine is used by the fishermen for making nets. A subsidy of $33\frac{1}{3}$ percent of the cost is allowed. Large quantities of nylon are imported by the Fisheries Department of Kerala State and distributed to fishermen at subsidized price.

Government of India have sanctioned a subsidy of 50% on engines to be shared equally by the Center and the State. Half of the cost of engines is also given by the Central Government as loan.

Mechanized boats are constructed by the Department and issued to fishermen at subsidized rate. A proposal for giving grants to Fishermen Cooperative Societies for fishing boats constructed or purchased by them is under consideration of the State Government.

Training in Designing and Construction of Boats

Two courses of 6 months duration for each course were organized by the Central Fisheries Technological Research Station, Cochin, and officers in charge of mechanized fishing schemes in various states as also persons from well-known boatbuilding firms were given training in designing and construction of boats. There are two Training Centers in Kerala State, one at Beypore and the other at Ernakulam where selected fishermen candidates are given training in mechanized fishing. The Fishermen's Training Center at Ernakulam commenced functioning in June 1956 and the Training Center at Beypore in September 1956. The course of training for each batch is 6 months and 60 fishermen are trained every year from these two Centers. During the training, the trainees are given instructions in various methods of mechanized fishing, navigation, seamanship and motor management. The total number of fishermen trained so far is 180.

A special staff including an Assistant Director of Fisheries has been appointed in the Department for the implementation of the new scheme for the organization of fishermen's cooperative societies.

Concerning processed fish there are no laws & regulations concerning quality control of fresh & cured fish in the Kerala State. There is no artificial

drying of fish in the State. Semi-dried prawns, fish meal & fish manure are produced at the Fisheries Technological Station at Kozhikode. There are 3 insulated vans and one 25ft. fish carrier boat in the Department and 6 insulated vans in the Indo-Norwegian Project, for the transport of fish. There are also two pick-up vans and one Landrover in the Department for the transport of fish fingerlings. There are two Government-owned freezing plants and two Government-owned ice plants and cold stores in the State. Besides these, there are two ice plants and cold stores under construction, one at Cochin and the other at Kayamkulam. There is also an ice plant in the Indo-Norwegian Project. In addition to these plants under Government, there are 3 private freezing plants in the State.

There are no mobile retail shops for increasing consumption of fish in the State at present.

Marine Fisheries Conference

A two-day conference of Ministers and officials connected with fishery development in the maritime states of India was held in Bombay on 8-9 November 1958. Presided over by the Deputy Minister of Agriculture, the conference was attended by about 75 officials representing the states of Bombay, Mysore, Kerala, Madras, Andhra, Orissa, and West Bengal. The conference was called with the object of exchanging notes among the officials of the different states and to discuss matters connected with the development of fisheries during the Second Five Year Plan period.

The conference was indicative of official interest in fishery development which has assumed greater importance in view of the tight food grain situation.

Under the Second Five Year Plan, an allotment of Rs.117,758,000 (US\$24.7 million) has been made for the development of fisheries. The development programs envisaged in the Plan include the expansion of current activities relating to mechanization of fishing boats, provision of increased harbor facilities, introduction of improved curing and marketing methods, and technological research. These programs may have to be curtailed due to rephrasing the Plan.

Inaugurating the conference, the Deputy Minister emphasized the urgent necessity of enlarging the fish supply in the country in view of the "alarmingly increasing pressure on land" caused by the rapidly growing population. Even at present, he said, the availability of fish was very low. Against an estimated annual requirement of 4,050,000 long tons of fish on the basis of minimum nutritional standards, current production is only of the order of 1,100,000 tons.

An important factor which had been hampering rapid development of the fishing industry, according to the Minister, was the continued low socio-economic condition of fishermen. Until very recently, private capital had not been attracted to the fishing industry. Recognizing that increased fish output was closely linked with the improvement in the fishermen's economic status, official efforts had been directed, from the very beginning, toward this end by means of setting up fishermen's cooperatives. Nevertheless, he admitted that the actual achievement in organizing cooperatives had not been appreciable. He advocated, therefore, that more attention should be devoted to this aspect of the problem by stimulating the establishment of a large number of cooperative fishing and marketing societies. In this

connection, he suggested that one of the purposes of the conference should be to devise ways and means of achieving this objective.

Referring to the introduction of mechanized fishing boats in recent years as a means of enlarging fish catch in offshore waters, the Deputy Minister expressed gratification at the considerable progress made in Bombay State in this direction. He said that he was aware that the demand for marine engines and modern fishing gear from fishermen in Bombay and other states was growing, but pointed out that foreign exchange posed a serious problem even to meet a part of the requirements.

In view of the Government's interest in expanding fishery resources, the Deputy Minister indicated that private and cooperative enterprises desirous of undertaking deep-sea fishing operations in collaboration with foreign interests and technical "know-how" would be assisted with long-term credits. In his view, the foreign collaborators should contribute technicians and capital equipment for fishing, storage and processing on reasonable terms. In this connection, he drew attention to the successful operations of a commercial fishing company in Bombay which had aroused interest among local industrialists. He also disclosed that the Government had under consideration a proposal to establish deep-sea fishing stations in Cochin (Kerala), Tuticorin (Madras), and Vishakapatnam (Andhra) on the lines of the exploratory station operating in Bombay since 1948.

On the question of marketing, the Deputy Minister observed that facilities for quick transport of fish from landing sites to consumer markets needed to be

augmented. Regarding exports, he noted that large quantities of dried fish were being shipped out of India. A small export trade has also been built in frozen shrimp and spiny lobsters, chiefly with the United States. He also pointed out that freezing of fish required to be developed on a large scale if exports were to be expanded and said that the Government would offer appropriate assistance to encourage the processing of fish and fish products for export.

The conference resolved itself into four sub-committees to facilitate detailed consideration of the various aspects of fishery development. These included training, research, exports, quality standards, transport, marketing, organization of cooperatives, and utilization of facilities available in the community development projects. The conference reconvened on 9 November to discuss the reports of the sub-committees.

The conference adopted a set of 37 recommendations covering practically all aspects of marine fishing, marketing, and transport. The conference proposed that the Central and State Government's encourage the formation of private fishing companies for catching, processing and distribution of fish, both for domestic consumption and exports. The need for observing high-quality standards for export purposes was emphasized, and it was recommended that only high-quality products should be exported. It was also recommended that harbor and docking facilities for fishing vessels be improved. With respect to mechanization of fishing craft and gear, the conference recommended that priority be given to the import of engines and other ancillary equipment. It was further recommended that local firms be given appropriate assistance in the

manufacture of engines and other fishing gear.

The conference also proposed that credit facilities be extended to cooperatives engaged in the production, marketing and transport of fish on the same lines as agricultural cooperatives. Other suggestions included the provision of insulated and refrigerated railroad cars and trucks for fish transport, establishment of separate fish markets in urban areas, construction of cold stores, and the inclusion of fishermen villages in community development blocks. (*Comm. Fish. Rev.*, March 1959).

Fish Meal Plant

A fish meal plant was designed and constructed in the Central Marine Fisheries Research Station, Mandapam, to carry out pilot scale investigations. It permits preparation of fish meal by fermentation as well as by the conventional reduction methods. It is simple in design and has a capacity of holding 100 lb. of raw fish at a time, the entire assembly costing only about Rs. 500. One of the main considerations in the development of the plant has been to keep operational costs as low as possible so that the overall cost is within the reach of the common fishermen.

The essential parts of the plant are a treatment chamber, a drying chamber and a heat source. The treatment chamber consists of an inner chamber and an outer chamber joined at the top by screw clamps and Helite sheet packing. The drying chamber comprises of a rotating inner drum and a stationary outer drum. The treatment chamber is heated by a coal oven. A current of air from an air blower is allowed to pass through the lower portion of the

oven to ensure a steady flame. A copper tube coil is fixed to the upper region of the coal oven which supplies hot air to the rotating chamber.

The drying chamber and the air blower are connected with ball bearings to a $\frac{1}{4}$ h.p. motor. The entire unit is assembled on a wooden platform, 7 ft. $\times$ 4 $\frac{1}{2}$ ft.

The minced fish flesh is treated with defatted butter milk at pH of 4.5, mixed well and maintained at a temperature of 35°C. for about 2 hours; it is then heated for 15-30 min. in the inner chamber by steam generated in the outer chamber; when flesh coagulates it is taken out by means of wire baskets; excess moisture is pressed out in a hand press leaving a press cake of moisture content of about 45 percent; press cake is then transferred to the rotating dryer; steam is passed through the outer drum while hot air at 200°C. is directed into the inner drum; rate of flow of air is adjusted mechanically to the desired temperature; steam in the outer drum keeps the fish cake in a hot condition and facilitates speedy liberation of moisture from it. Trials indicate that the air temperatures between 150°C. and 200°C. are best suited for the production of quality fish meal.

The maximum time taken for the conversion of the raw fish into dry powder is three hours. The fermentation period is found to be about 1 $\frac{1}{2}$ hr. in the case of shark. However, longer periods have been found advantageous in the case of other fishes. (*Indian Fish. Bull.*, July 1958).

Supply and Marketing of Fresh Fish in Delhi

Daily consumption of fresh fish in Delhi is estimated at four tons, most of which are fresh water fish from the

Yamuna river, with some supplies coming from nearby localities in the Punjab and Uttar Pradesh. Salt water fish are not in much demand but small amounts mostly pomfrets and *Hilsa* are received by rail from Veraval in Saurashtra. The Department of Fisheries, Bombay State, puts the amount of salt water fish shipped by rail from Saurashtra to Delhi at 300 tons during 1956-57, a hundred percent increase over 1955-56.

Commercial fishing rights (inland waters) vest in the State Governments and are issued on tender to the highest bidder for a specified locality or area (tank, bank of a stream, etc.) for a limited period, usually one to two years. The licensee is not necessarily a fisherman, for licenses may be granted to individuals, cooperatives, etc.

Common fresh water fishing methods includes hand lines, and cast nets. Ice is not available at the point of capture, so that delivery to market is a matter of some urgency. Transportation may be by foot, bicycle, tonga, rickshaw and rarely by truck.

There are four privately operated auction places, where fish are sold to wholesalers. These auction houses charge six nP. per rupee, about 6% for their services. However, this is not the extent of their participation in the sales, for they are not only auctioneers but money-lenders, and their clientele in many cases are indebted to them for loans on the purchase of fishing gear and for other purposes. Since fishing is an unpredictable industry, interest rates are high so that the fisherman often receives only about fifty percent of the selling price after his account with the auctioneer has been settled.

Demand is relatively stable but production is not, consequently there are

wide daily fluctuations in price, depending on supply. Consumer preference for certain species on religious or geographical grounds may also cause unusual fluctuations in prices due to relative abundance of various kinds of fish.

Although the handling of fresh fish from producer to consumer leaves much room for improvement from a sanitary stand-point, the fish arrive at the auction rooms in unusually fresh condition. (*Ind. Fish. Bull.*, October 1958).

Socio-Economics

There are 101 Fishermen's cooperative Societies in the Bombay State as on 30th June, 1957, with a membership of 25,484, share capital of Rs. 10,17,454 and working capital of Rs. 30,14,840.

With a view to encourage cooperative endeavor among the fishermen, preferential claims are given to fishermen's cooperatives while auctioning the Government lakes and tanks. The Government has also sanctioned a special scheme under the Second Five Year Plan for the development of cooperative fisheries.

Long term finance is being made available to these societies for mechanization of fishing craft, purchase of big fishing nets, trucks etc. Financial assistance by short term loan is made available to the fisheries societies through the State Cooperative Banks at the rate of 2% below the bank rate. The Fisheries Societies will make available short term loans to fishermen at 6½% interest repayable in 6 to 8 months. Fisheries Societies generally get Rs. 10,000 as short term finance. For the loans, the societies take the personal security of the members concerned and also the security of future catch of fish. It is binding on the fishermen receiving such finance to sell their catch through the cooperative fish marketing organization of the area. A subsidy of Rs. 500 for the first two years and Rs. 250 for the third year, towards managerial staff is sanctioned to such societies. Five societies were granted of Rs. 2,110 towards managerial costs during the year. (*Indian Fish. Bull.*, Oct. 1958).

INDONESIA

Japanese to Establish Fish Canning Industry in West Sumatra

Two Japanese fishing experts during March 1959 were making a survey of the Padang region of West Sumatra with the objective of establishing a sea fishing and canning industry in that area. The industry is to be financed by Japanese reparations and is sponsored by the Indonesian Ministry of Veterans Affairs, which sent the technicians to make the survey. Basic equipment and supplies

will include a 30 to 40 ton vessel with a 100 h.p. engine, three 70 ton vessels of 200 h.p., an ice plant with a daily capacity of ten tons, two freezing rooms, a cannery with a capacity of 200 cases of canned fish a day, and a fish meal factory.

One of the Japanese technicians said the reason for establishing the industry in the Padang area was that West Sumatra suffers an acute shortage of fish, with prices twice as high as in Djakarta. (*Comm. Fish. Rev.*, June 1959).

JAPAN

Expanding Exports of Frozen Tuna to Europe

A direct export of frozen tuna to Yugoslavia was reported in March 1959 by a Japanese fishery company. The same company, according to reports, has also concluded a similar contract with a buyer in Greece. In addition, two other Japanese firms are accepting offers from Turkey. A sample of frozen tuna early this year was shipped to West Germany and the Netherlands.

The price of these offers to Europe is \$280-290 a metric ton c.i.f. the European country. The Japanese are enthusiastic about this new outlet for frozen tuna, and it is considered a blessing to Japanese Atlantic tuna clippers because their landings in Italy have been restricted to only two times a year on the basis of the latest agreement.

King Crab Production Prospects, 1959

The Japanese 5,000-ton king crab factoryship *TOKEI MARU*, sailed from Hakodate, Japan, on 1 April for her annual trip to the fishing grounds off the north shore of the Alaska Peninsula. The *TOKEI MARU* is the only Japanese king crab factoryship operating in the Bristol Bay area. As in the past, the factoryship (operated jointly by three large Japanese fishing companies) will employ two 108-ton fishing vessels and 8 Kawasaki boats, and will be fishing until about July 15, 1959.

In their license application, submitted on March 24, 1959, the operating companies asked for an increase in the quota from the 57,000-cases limit of the past two years to 70,000 cases. Since the permitted five-percent allowance for error

has resulted in a pack of 59,850 cases in each of the past two years, it is expected that the pack this year will be about 73,500 cases. As reasons justifying their request for an increase, the companies cited last year's satisfactory catch rate of about 11 crabs per shackle of net, the good recovery rate of 18.9 crabs per case, and the fleet's ability to attain its catch goal well within the scheduled time. The Japanese Fisheries Agency, in granting the request, agreed that the Bristol Bay king crab resource appears to be in a healthy condition. The Agency further noted that, since last year, American crab trawlers, who had been fishing the same grounds as the Japanese shifted their efforts to new grounds south of the Aleutians, thus removing some fishing pressure from the resource exploited by the *TOKEI MARU*. The Agency emphasized that the new pack quota limit has been granted for one year only and that the effect on the king crab population will be studied carefully before any decision is made to continue fishing at the new high level.

In the other Japanese king crab factoryship fishery, that of the Sea of Okhotsk, prospects are less bright. On March 31, in the first session of the Japan-Soviet Fisheries Commission to deal with king crab, the Soviet delegation proposed that the Japanese catch be cut to 200,000 cases from last year's 320,000 cases, at the same time offering to reduce their own production from 340,000 to 300,000 cases. The Soviets also proposed allocation of definite fishing areas to the fleets of each country, shortening of the fishing period, cutting down the amounts of net set, and

shortening the length of time that nets can be left in the water. The Japanese delegation, while admitting that the king crab population of the Sea of Okhotsk shows signs of a decline, rejected the Soviet proposals as unnecessarily severe and unwarranted by conservation considerations. The press quoted industry sources as saying that the proposed allocation of fishing grounds gave all of the good grounds to the Soviet fleets. (*Comm. Fish. Rev.*, June 1959).

Increasing Frozen Crab Meat Consumption

A project for increasing crab meat consumption is under way in Japan. Until recently, canning has been used for preserving crab meat, but according

to Japanese experts, crab meat can be successfully and advantageously preserved by freezing. The Japanese plan to pack frozen crab meat in eye-appealing packages. They expect the frozen product to sell at a lower price than the canned. This is expected to increase consumption by placing crab meat within easy reach of many consumers for whom canned crab meat is a luxury.

Large-scale preservation by freezing will also be applied to langostinos, shrimp and other crustaceans.

The prospects for the success of this project are thought to be excellent. Increased consumption is expected to stimulate efforts to increase catches. This will also help satisfy the large domestic demand for crab meat. (*Comm. Fish. Rev.*, April 1959).

KOREA

Mechanized Handling of Gear

Complete set of Kuralon net materials for single-boat-type purse seiner and its accessories was imported by 1956 ICA fund and the first fishing cruise was started with installation of power-block-type net hauler, on 9 June 1958. The result of the operation was remarkable and was more efficient as compared with the conventional two-boat-purse seiners. As a result, the owners of purse seiners are now inclined to turn from the conventional two boat seine to single boat fishing method with installation of a power-block net-hauler.

Use of Artificial Fibers for Making Fishing Gear

In the gillnet fishing industry prior to 1952, cotton net materials were used mostly but in December 1952, with the

importation of nylon gillnet for Spanish mackerel by a certain fishing company in Pusan, Korea, all the gillnet fishermen have replaced their cotton gear with nylon material. The situation regarding the purse seine is the same.

Fishermen's Training Schools

For the training of fishermen, a seaman's training school was opened in July 1953 and has already produced more than 10,000 graduates, all of whom are engaged in the merchant marine and fishing industry.

In the school, two courses are offered, one regular course, the other, a special course. The school trains the temporary and permanent fishing boat skipper, and chief engineer (B & C grade license for fishing vessel is granted after examination) and is divided, for

this purpose, to navigation course and engine course, teaching all the required subjects for license requirements.

Artificial Drying of Marine Products

The annual production of dried marine products is about one third of the total marine products in Korea and dried fish is considered as an important marine product.

In 1957, the total production of dried marine products was approximately 28,000 tons which consisted of: 12,324 tons of sun dried, 8,867 tons of boiled-dried (steam), and 6,800 tons of others.

In the same year, the dried marine products exported are as follows:

	Tons
(a) Shrimp.....	318.80
(b) Anchovies.....	48.400
(c) Cuttlefish.....	2,943.
(d) Oyster.....	40.
(e) Laver.....	21.200
(f) Agar-Agar.....	277.428
(g) Seaweeds.....	2,484.
(h) Others.....	68.20
Total	6,150.128

Though the output of the dried marine products has increased every year, drying is by the old method, such as a sun-drying, boiling and drying, salting and drying, etc. Now a modern type drier is installed. Two agar-agar freeze-drying mechanical plants are built, and are in operation presently with a capacity of one ton per day, and two more plants are being constructed.

For the production of fish meal and fish oil, the Central Fisheries Experiment Station has established a pilot demonstration plant at the Experiment Station from the ICA assistance. One 2-ton per

day capacity plant has been completed and is under operation, and another bigger plant is being built.

Boiled-Dried Fish Production

The types of boiled-dried marine products are:

Anchovies, cod, shrimp, mackerel-pike, oyster, pollack, sole, ocean-perch, abalone, Spanish-mackerel.

Total production is 8,867 tons in 1957.

Total production of 792 tons of the boiled-canned marine products consist of: mackerel, mackerel-pike, bastard, Rock-trout, sardine, crab, shrimp and anchovy, etc.

The output of dry-cut-boiled-fillet which is made from bonito, shark, bastard, croaker, cod-fish, etc. are increasing.

Though the output of these all kinds of boiled fisheries products have reached 10,000 tons, very little is exported overseas.

Preservation of Freshness and Transportation of Fresh Fish

Annually about 403,000 metric tons of fish and shellfish are caught. However it is very difficult to store this fish and shellfish before consumption. There is considerable wastage due to spoilage.

Proper utilization of the fish and shellfish which will improve the food economy in Korea, can be effected if the period of preservation of freshness can be extended.

Though the transportation of fresh fish by ice-box holding method is used, it is difficult to instal refrigeration facilities in all fishing boats under the present economic situation. Therefore, the Central Fisheries Experiment Station is now carrying out various experiments to solve

the problems concerning the handling of fresh fish at the sea right after its catch, preservation methods, storage and transporting of fish, and fish market management, etc: (a) Determine the keeping time in ice of important fresh fish and shell-fishes. (b) Utilization of antibiotic ices. (c) Relation between dead and freshness conditions. (d) Washing problem after death. (e) Utilization of preservatives. (f) Disinfection problems of decks and bins in fishing boats. (g) Improvement and disinfection of fish containers. (h) Investigation on storage of fish in refrigerated water. (i) Improvement of handling fish after landing at fish market. (j) Fresh fish transport problems from the fishing grounds to the fish market.

The handling and transport problems on board the fishing vessels have been improved. Transport by land is not considered as important because geographically the country is surrounded by sea on three sides and it is easy to transport fresh fish by water to most of the places. Only for shrimp, refrigerated cars or trucks are used.

Measures to increase Fish Consumption

Approximately 400,000 tons of shell-fish and fresh fish and approx. 50,000 tons of seaweeds and other marine products are annually landed.

Out of this, approx. 100,000 tons are processed and the rest consumed as fresh fish.

Most of fresh fish is bought and sold by fish market, small market and by peddler. For lack of storage facilities and unsuitable sanitary facilities, the consumption of fresh fish fluctuates due to weather changes.

In rainy season, the consumption of fresh fish decreases due to difficulty in

transporting fish to small cities or to high ground area.

It is planned to establish small fresh fish retail shops which have small cold storage facilities at different areas in order to promote fish consumptions. Moreover, a modern style fish market center is planned in Pusan which is one of the biggest fish marketing harbors in Korea.

Frozen Fish and Ice

Most of the ice plants and cold storage facilities which were destroyed by the Korean war of 25th June 1950, were gradually rehabilitated and reconstructed. During the past few years, the Experiment Station has conducted experiments on frozen marine products to develop wider markets for fish.

As a result of this program, the quality of frozen marine products have proved to be satisfactory not only to the Korean authorities but also to foreign experts. Dollar earnings have been increased by the operation of new sanitary plants. A trial shipment of 50 lb. of frozen shrimp to many U.S. firms was made in May 1957 which was found to be satisfactory. Since then, a total of 82,255 lb. of frozen shrimp was exported up to the end of May 1959. There are also contracts to sell frozen shrimp to 8th U.S. Army in Korea under cooperation and coordination of the O.E.C. With a total of 50 ice and processing plants, which are mostly situated at major fishing ports, the daily production rate is 1,002 metric tons of ice and there is storage capacity for 860 tons of ice.

Mostly sharp freezing method is adopted in those plants.

Most of this ice is consumed in all fishing boats for holding fresh fish because no mechanical refrigeration facilities are available on those fishing boats.

Development of New Marine Products

The older manufacturing industry of marine products was not so efficiently managed and were destroyed because of the Korean conflict which caused destruction of most facilities and equipment. However, some of the newly established plants and other destroyed processing plants are now rehabilitated and are in sound operation with the assistance of O.E.C. and with the funds invested by individuals.

For the last several years, the Central Fisheries Experiment Station has conducted many demonstrations to organize and to train business men to enable them to export marine products, such as, porgy, Spanish mackerel, halibut, yellow tail, crab, shrimp, etc. Also other items included in this program are round, dressed, filleted, steak fishes and other various cannery products. It is planned to establish a large facility for this program to export marine products in large quantity.

Shrimp Fisheries

The program to produce frozen shrimp for exports is progressing satisfactorily and some excellent packs were being accumulated for future export. Several companies are very much interested in the possibilities of frozen shrimp and are preparing to enter into this market. The fishing firm which had packed 4,500 lb. of frozen shrimp under United States Army Inspection Regulations completed a second contract for 4,000 lb. for the United States Army. Another firm has constructed a shrimp-processing plant adjacent to an ice plant in Pusan. The buildings and installations are patterned after a pilot plant developed by the Central Fisheries Experiment Station. Shrimp are now being packed

for domestic and export sale. A third firm at Pusan Jin is constructing a frozen seafood packing plant adjacent to its ice plant. This plant was also being built to standards recommended by the Central Fisheries Experiment Station.

Standards Program

A series of meetings were held with the Director of the Korean Fisheries Service and United States fisheries advisors to finalize the draft for the proposed Ministerial order setting up standards for the inspection of frozen fish and shellfish for export. The proposed regulations set up standards for processing facilities, processing procedures, and conditions for inspection which will meet both United States military and United States Food and Drug Administration requirements. The standards are being examined by a legal staff prior to being submitted for promulgation.

A training course was held at the Central Fisheries Experiment Station in November to teach inspectors of the Central Fisheries Inspection Service how to conduct inspections under the new regulations. Inspectors from Pusan, Seoul, Pohang, Mokpo and Yosu attended.

Fishing Fleets

Plans and drawings for an improved medium-size fishing vessel were developed by the Office of Marine Affairs and United States fisheries technicians. Lists of fishing boats in need of repairs and/or modernization have been prepared. Efforts on the part of a United States fisheries technician to assist the Korean fishing industry to obtain more modern fishing vessels has made it necessary to initiate action to have the Korean vessel inspection laws revised and brought up to date. Draft of the proposed revisions are being prepared.

Halibut

Following the successful program to develop shrimp processing, efforts are now being made to develop a species of halibut for processing and marketing. At present this species is not utilized to any extent in Korea. Sample packs are being prepared and, if acceptable, the exploitation of these species could be the means of increasing substantially the Korean catch.

This fishery would provide a needed incentive to keep trawlers active during the summer season when they are normally inactive.

Fish Liver Oil Industry

Fish liver oil plants located in the Republic of Korea produced about 150 metric tons of fish liver oil in 1957. From April 1957 to April 1958, 1,142 drums of fish liver oil valued at US\$28,385 were exported mostly to Japan. In terms of vitamin A units, the annual fish liver oil production is about 3 to 4 trillion units and the export value is just under 4 U.S. cents a million units.

Exports of fish liver oil by Japan are estimated at about 100 trillion vitamin A units. As about all the Korean production is exported to Japan for further refining or resale, Korean production amounts to about 3-4 percent of the Japanese export supply.

In early 1958, the Japanese fish liver oil industry was overstocked and upset by a declining market. But, by late August, following an either poor or curtailed spring and summer production, the supply and demand situation improved. The world market for fish liver oils, due to declining demand, is apparently quite sensitive to any oversupply.

The principal Korean raw materials are livers from sharks, Alaska pollack, and cuttlefish (very low vitamin A content). All the raw materials used for fish liver oils are byproducts from the food fish industry and processors are able to obtain the raw livers at low prices of 0.5-3 cents a pound. The cost of the raw material in terms of vitamin A units is not more than 2 U.S. cents a million units. This low unit cost gives the Korean producer a favorable competitive position, even in a declining market. (*Comm. Fish. Rev.*, March 1959).

Landings and Exports of Fishery Products, 1958

In 1958, South Korea's landings of fishery products amounted to 395,000 metric tons, a decrease of 8,000 tons from 1957. Landings of fish and shellfish in 1958 were up 15,000 tons, but the production of seaweed and other products declined about 23,000 tons.

Exports of marine products totaled 11,000 tons in 1958. These exports were valued at US\$3.6 million, or about 22 percent of the dollar value of all exports. Compared with 1957, the exports of marine products increased about 500 tons, but were lower in value by about \$560,000. In terms of value, the chief export items were cuttlefish, fresh and live fish, agar agar and seaweed. The principal customers for Korea's marine products were Japan and Hong Kong.

Fisheries Development Program

As part of South Korea's Fisheries Development Program which is aided by technical advisors of the ICA, three vessels from the Korean Fisheries Experimental Station carried out offshore shrimp explorations on the east coast in

the Pohang area during January. Catch rates were studied in deep water with the trawling equipment introduced by the development program. Local fishermen are being taken on the vessels as observers in these operations. There are at least thirty vessels in the Pohang area which could be converted to this type of shrimp fishery. It is estimated that the production from these thirty vessels could be as high as 12,000 lb. of headless shrimp per fishing day.

The tuna longline vessel JI NAM HO returned to Pusan from American Samoa on 23 December 1958, after a cruise of 11 months. This vessel has been discharging tuna to an American-owned cannery at Samoa. A complete report of the cruise and a financial report on operations are being prepared by the owners.

The success of the new-type vessels and seining equipment, introduced by the Fisheries Development Program, has encouraged local investors to start new vessel construction. These vessels are following a similar design and will be equipped in the same manner as the first demonstration vessel. It is expected that eight new vessels of this type will be ready for sea in April 1959. If they produce fish as well as the demonstration vessel did in 1958, it will mean an additional 24,000 metric tons of fish for Korea.

The regulations governing sanitation, quality, and inspection of frozen fishery products for export, prepared with the assistance of the fisheries technicians, were promulgated by the Minister of Commerce and Industry on 26 December 1958. Initial inspections of processing facilities are being made preparatory to certifying those plants which meet the required standards. Announcement of certification will be made later.

The demonstration fish meal plant at the Pusan Experiment Station made its first test run at the end of December 1958. Some operating difficulties are being corrected and the plant readied for operation.

A Korean "Frozen Seafood Export Association" has been formed. Its members will include all producers and/or exporters of frozen seafood who have approved plants. Office space has been set up and management personnel have been employed. The association has been endorsed by the Office of Marine Affairs and has been delegated by the Ministry of Commerce and Industry as the recognized export agency. A brand name for frozen seafoods has been selected and drawings for the trade mark and package printing are being prepared. A promotion program is planned to create buyer interest in Korean products by publishing periodic letters and brochures. (*Comm. Fish. Rev.*, April 1959).

PAKISTAN

The Government has drawn up a program for the exploitation of fish resources of the country and has decided to appoint a Fisheries' Development Board under the chairmanship of the Secretary, Ministry of Food and Agriculture, in order to implement the

program. The question of development of fisheries has assumed greater importance in the context of conservation of the cattle wealth of the country and restrictions imposed on the slaughter of animals by compulsory observance of meatless days. The demand for fresh fish

will steadily increase as restrictions are increased on livestock slaughter.

The object of the fisheries development program is to provide fresh and cheap fish by providing quick transport, preservation and marketing facilities and development of fish industries to earn foreign exchange. So far as Karachi is concerned, a marine fish harbor is under construction since 1956 and when completed it will have all facilities for the fishermen besides a Marine Fisheries Research Station which will be at the disposal of the Universities and institutions also. Two departmental trawlers have been exploring the west coast of Pakistan with a view to finding fishing grounds. The catch is handed over to the Karachi Fishermen Cooperative Society under a contract. The gross income of this year to the Society was about Rs. 150,000. Six fishing grounds were discovered and the information passed on to those engaged in commercial fishing.

Production of fish has also been increasing steadily owing to the introduction of nylon nets and mechanization of fishing boats. Government has imported nylon twine worth Rs. 3 million and this has been supplied to fishermen on deferred payment. For mechanizing the fishing boats, 155 marine Diesels have been received under ICA Commodity Aid. The first duty of the Fisheries Development Board will be to make arrangements for early utilization of these marine Diesels. The Fisheries Department hope that by the beginning of the next fishing season, more than 50 boats, in addition to the existing 75, will be ready for operation in Karachi and 10 in East Pakistan. The Department also expect that a big cold storage at the Karachi Fish Harbor will also be ready by the next fishing season and the wholesale Fish Market will also start functioning.

Fishing of Oysters Prohibited

Edible oysters fished from estuarine beds along the coast of what is now West Pakistan were in abundant supply till 1897 when a sub-marine volcanic eruption on the Mekran coast ruined the natural oyster beds in the entire region, especially in the creek system of the Indus. According to available information oyster production dived down to 17,175 dozens in 1898 and after a few years ceased altogether. In 1909 at the request of the Government of Bombay, James Hornell (Marine Assistant, Madras Fisheries) carried out a survey of the oyster raising areas along the Sind-Baluchistan coast, but his recommendations were not implemented till 1945 when, at any rate, the oyster beds of the Indus creek system began to show signs of revival. Oyster production in this sector of the coast rose to 15,660 dozens in 1947-48 and to 35,508 dozens in 1951-52. Since then a decline seems to have set in, the main cause, according to a survey carried out by the Ministry of Agriculture, being over-exploitation of the oyster-beds in the Indus creek system. Karachi Administration's two year ban on oyster-fishing having proved ineffective, the President has issued an ordinance reinforcing the ban by prescribing more severe penalties for the offenders. This ordinance, which has already come into force, will, it is hoped, not only arrest further depletion of this prolific source of exceptionally delicious and nutritious seafood but, by augmenting it, will also open up the export prospects for Karachi oysters which are already noted for their superlative quality.

Fisheries Development Programs

Apart from the Government Sector fisheries programs, the Government of Pakistan have recently sanctioned a program

for fisheries development under private sector for implementation within the course of a year at the total cost of about Rs. 12 million (Rs. 3 million internal and Rs. 9 million in foreign exchange). This program includes 2 carrier vessels, 8 mechanized fishing boats and 1 shrimp trawler for Karachi; 1 carrier vessel, 4 mechanized fishing boats and 1 shrimp trawler for the Mekran Coast; 4 insulated vans and 1,000 insulated boxes for West Pakistan; 4 fishing launches and boats, 2 carrier vessels, 4 insulated vans, 2 shrimp trawlers, 4 cold stores and 4 ice plants for East Pakistan. It also includes 2 shrimp freezing plants; 2 canning plants, and 2 fish meal plants for the Mekran Coast—one each at Parnie and Gwadar; and 2 shrimp freezing plants, 2 canning plants and 1 fish meal plant for East Pakistan. Government will give reasonable assistance to private parties who may wish to take advantage of and participate in this program. Cooperative Societies will be given preferential treatment. To give further incentive to private fish industry, the Central Government have now reduced by 12½% the current prices of 155 marine Diesels imported for development of fish industry. These engines are being distributed all over Pakistan i.e. at Chittagong, Cox's Bazar, Khulna, Parnie, Gwadar and Karachi. Two ocean going motor boats constructed at Chittagong by the Central Fisheries Department with the help of the boat-builders of West Pakistan, have been completed and are being fitted with 30 h.p. engines and are expected to be completed by the end of September 1959 for distribution to fishermen. Another boatbuilding yard has also been established by a private party which has completed the construction of a fishing launch with one of the marine Diesels

allotted by the Central Fisheries Department. It has started construction of two more launches for which it has applied for engines. This firm is willing to undertake construction of fishing launches for others also.

This Ministry of Food and Agriculture have decided to allot marine Diesels at present lying in Chittagong to private parties willing to take them on the basis of 10 percent initial payment. More engines will be diverted from Karachi to Chittagong if necessary.

The Karachi Fishermen Cooperative Society has offered to impart training in the manning of mechanized boats to four East Pakistan fishermen. These East Pakistani fishermen will be trained at Karachi by the Karachi Fishermen Cooperative Society and each will be paid Rs. 100/- per month as subsistence allowance for their families in East Pakistan besides both way deck fare and reasonable cost of maintenance at Karachi.

Six Private Trawlers for Next Fishing Season

The Central Fisheries Directorate disclosed that by the next fishing season which starts from September six private trawlers will be operating off the coast of Karachi. At present Pakistan has only two modern fishing trawlers which are owned by the Central Fisheries Department, Government of Pakistan. During the four months of their operation (December 1958 to March 1959) they caught 225,232 lb. of shrimp and fish valued at Rs. 125,000.

Three private trawlers are already under construction and the keels of three more have been laid recently. It is expected that all the six private trawlers will be ready before the next fishing season starts. Side by side, the Central

Fisheries Department has been training people to man private trawlers. More than 50 boats fitted with marine Diesels are also expected to be ready by the beginning of the next fishing season. At present 75 such mechanized boats are operating in the Arabian Sea.

Japanese continue to show Interest in Development of East Pakistan Fisheries:

During December 1958, a Japanese fishing vessel, the CHOSUI MARU on the invitation of the Government of Paki-

stan called at Chittagong. While in the Bay of Bengal, the vessel undertook a limited amount of exploration of the fishery resources of the Bay area. At the same time, according to local press accounts, two Japanese fishing experts and members of the International Fishery Cooperative Association called on the East Pakistan Director of Fisheries to discuss exploitation of the Province's fish resources. Press reports indicated that the experts planned to submit a report on their findings to the Government of East Pakistan. (*Comm. Fish. Rev.*, April 1959).

PHILIPPINES

Fisheries Bureau Transferring to Diliman, Q.C.

The Bureau of Fisheries is transferring from its present quarters at 1218-1220 M.H. del Pilar, Ermita, Manila, to the Bureau of Agricultural Extension Building at Diliman, Quezon City, by the end of June 1959. By July 1, 1959, all units of the Bureau will be in Diliman.

New Fishery Sub-Stations and Demonstration Stations

Funds have been made available to the Bureau of Fisheries for the establishment of four new fishery sub-stations, one demonstration fish farm and one demonstration oyster farm in a special budget of the Bureau recently approved by the Office of the President.

The four new fishery sub-stations will be established at (1) Damortis, La Union; (2) Puerto Princesa, Palawan; (3) Cadiz, Negros Occidental; and (4) Dipolog, Zamboanga. Each station will be manned by one fishery officer as officer-in-charge and two fishery agents.

The demonstration fish farm will be located at Talibon, Bohol. An initial appropriation of P 15,000.00 has been set aside for the construction of this fish farm, for salaries and wages and other sundry expenses.

Similarly, an appropriation of P 10,000.00 has been approved for the establishment of a demonstration oyster farm in Sitio Raois, Santo Tomas, La Union. This amount includes cost of construction, salaries and wages and other expenses.

Colombo Plan Trainee for India

Mr. Adolfo M. Aldana, Chief, Fish Stocking Section, Inland Fisheries Division, has been accepted for training by the Indian Government, under the Colombo Plan. Mr. Aldana will undergo training in inland fisheries and fisheries administration in the Central Inland Fisheries Research Station, Calcutta, India. He will leave for Calcutta upon receipt of advice from the Department of Foreign Affairs regarding the terms and conditions of the training grant and

the date of commencement of the training. It is understood that the training will be for a period of one year.

Japanese Fishing Gear Operations Demonstrated

The results of the demonstration of the operation of several Japanese fishing gears by the Marine Fisheries Division, Bureau of Fisheries off Mariveles, Bataan on April 13 to 15, 1959 was released recently by Director of Fisheries.

The operations were conducted by the U.N. Technical Assistance Board in the Philippines through the FAO/ETAP Specialist, Mr. Tatsuzo Suzuki and the Bureau of Fisheries team.

Operations of the trammel net (nylon), kitang longline (Kuralon), sardine gillnet (Kuralon) and mackerel angling and squid angling (Japanese hooks and jigs) were carried out on three hired motor boats and two bancas.

All gears were operated at night. The trammel net which caught assorted species was most successfully operated during its 15 night operations. Kitang longlining, with the use of Japanese longline hooks proved the second most successful. Compared with the native kitang, the Japanese gear was observed to be more effective in catching bottom reef species because more number of hooks can be set.

The mackerel and the sardine gillnet and squid angling were not successful in fish catch. These gears are more effective during dark nights and there was a bright moon during the period of operation.

In a comparative operation, native squid angling with only one hook, caught more than by squid angling with five hooks using Japanese jigs.

Financial Assistance assured for Fishery Enterprises

The President of the Philippine National Bank has assured that the Bank will do its part in supplying the required credit financing for sound commercial-scale ventures in the field of fisheries. The Bank can, however, only push its financing as fast as the *entrepreneurs* in these fields can organize production in a manner and at a scale which will make the venture both feasible and secure for bank financing. It is essential that a fishery enterprise should have a good technical and commercial organization in order that credit financing may be extended by the Bank and other financial institutions.

Investors in fishery enterprises should take advantage of this policy of this Bank as well as the Development Bank of the Philippines, and other financial institutions which extend credit facilities to deserving applicants. Liberalized credit financing is one of the incentives that would accelerate the development of agricultural and fishery industries.

Fish Processing Demonstrations

In connection with the Aparri Petit Carnival and Fair held from May 1 to 12, 1959, the fish processing mobile unit of the Bureau of Fisheries performed a series of fish canning demonstrations in the fisheries booth in the Carnival grounds. The demonstrations, with explanatory talks, were attended by fishermen, businessmen, farmers, and members of the staff and students of the Aparri School of Fisheries.

After the fish canning demonstrations in the Aparri Petit Carnival and Fair, the fish processing mobile unit also gave fish canning demonstrations to

the Ilocos Norte YMCA Campers and barrio residents of Barrio Pasaleng, Pagudpud, Ilocos Norte. The YMCA Campers and the farmers and fishermen who attended the demonstrations were impressed with the demonstrations. The barrio residents are considering to put up a home canning project in the locality.

Fish Stocking in San Pablo City

A fish stocking team of the Bureau of Fisheries undertook fish stocking work in San Pablo City on 13 May 1959. The team planted in Palakpakin Lake 5,500 dalag fingerlings, 200 goby (bia) breeders, 6 common carp breeders, 1,300 freshwater shrimp breeders and 100 ayungin breeders. These fish seeds had been obtained from the Bureau's freshwater fishery station in Tanay Rizal. (*Fisheries Gazette*, May and June 1959).

Fisheries Development aided by Intense Research Program

An intense research program, based on 1 research station, 9 laboratories, and some 60 research workers, is helping to speed up and direct the development of the rich fisheries of the Philippines, according to the report of a FAO Fishery Biologist.

The research program seeks to provide information on the biology of commercial species of fish in the Philippine waters. Studies are being made of the life history, habits, distribution, reproduction, rate of growth, and other biological factors of the fish. One of the difficulties faced in this program is the great variety of species of commercial fish found in the Philippine waters.

The Philippines have rich resources, but there is no predominant species such

as is known in the North Atlantic where a fishery can be based mainly on, say, herring, or some other predominant species. It is also a fact that not enough is known of the Philippine resources so that a great deal of research must be done.

A particularly important part of the work is to establish the productivity of a fishing area, especially in relation to gear and intensity of fishing effort.

This point has come to the fore recently because of the introduction of modern types of gear and equipment. Such new gear has led to considerable increases in catch and has given rise to fears by some of the fishermen, who still use the old methods, that the resources will be destroyed by overfishing. These fears are unfounded but with the changing and developing situation, there is no doubt that such problems will often recur.

There is a need now for a fleet of research ships, probably three, and there are hopes that such vessels will be provided in the next 2 or 3 years.

Market for California-type Sardines

Canned fish, and especially sardines or pilchards, are a staple item in the Filipino diet, and, since they are consumed largely by the lower income groups, price is the significant determining factor in their sale. Since California sardines are generally priced above competing brands from other nations, this has seriously affected the sale of California sardines in the Philippines.

While of considerably less importance than price, other factors have contributed to the decline in California sardine sales to the Philippines. These include the recent shortage of California sardines, which has led local importers to turn to Japanese and South African brands, and

the poor dollar position of the Philippines, which has encouraged private importers and the largest single importer to purchase inexpensive non-U.S. brands to conserve foreign exchange. A recently completed fish canning factory, which will can locally-caught sardines as well as other fish, will undoubtedly affect the Philippine market in the future.

The largest single importer of sardines into the Philippines sells his imports not only through licensed retailers, but also imports canned fish for other distributors and wholesalers. The firm's prices generally are the lowest offered in Manila as it tries to give its retailers a preferred competitive position.

An informal survey of local retail outlets not serviced by the largest single importer gave comparative prices for both United States and Japanese packs of sardines.

A comparison of the prices of United States and Japanese sardines will largely explain why the Filipino housewife, who cannot purchase native fresh fish because

it is too expensive, purchases the lower-priced Japanese and South African brands.

There is no question that if California sardines were competitive in price with those of Japan and South Africa they would continue to hold the largest share of the Philippine market. Filipinos prefer California sardines to those of other countries because they have a milder aroma and taste. However, only Filipinos of the relatively small middle class appear willing to pay the higher price for California sardines, and they also can afford fresh local fish, poultry and meat.

Unless the price of California sardines is made competitive or Philippine living standards rise to the point where the difference of five centavos on a can of sardines is of no importance to the mass of consumers, the American share of the local canned sardine market will continue to decline. The doubling of tariffs on U.S. imports beginning 1 January 1959, is likely to accelerate this trend. (*Comm. Fish. Rev.*, March 1959).

TAIWAN (FORMOSA)

Fisheries Landings in 1958

The 1958 fishery landings in Taiwan reached 229,677 metric tons. This broke the record of 208,121 tons set in 1957 and exceeded the target set in the Second Four-Year Production Plan by 9,677 tons. The catch by categories as compared with the 1957 catch is shown in the table.

Taiwan's Fishery Landings, 1957-58		
Type of Fishery	1958	1957
	(Metric Tons)	
Deep-sea.....	61,160	52,223
Inshore.....	81,720	71,552
Coastal.....	38,267	38,468
Fish Culture.....	48,530	45,878
Total.....	229,677	208,121

The greatest increase was from deep-sea fisheries, accounted for by the increase of offshore tuna vessels and bull-trawling vessels. The increase in catch from inshore fishing was due to larger boats and new motors and the heavy runs of moonfish (*Mene maculata*) and sea bream. The catch from coastal fishing decreased slightly due to the poor run of mullet and the stiff competition from powered boats. The increase from fish culture was due to an abundant supply of milkfish fry and the use of more reservoir ponds for raising fish.

Whaling in 1958

The 1958 whaling operation with Japanese cooperation was more successful than the previous year. A Japanese whaler of 270 tons, KYOMARU NO. 3, was dispatched to Banana Bay off southern Taiwan for three months' hunting from January to April. A total of 12 humpbacks were caught as against only 4 in 1957.

Frozen Tuna Exports

The four 350-ton tuna longliners caught enough fish in their trips to the Indian Ocean to warrant some small exports of frozen tuna to the United States. A total of 146 tons of frozen tuna (mostly yellowfin) were exported in 1958.

Pesticides used in Milkfish Ponds

The use of Diazinon or BHC for controlling Chironomid larvae was developed by the Taiwan Fish Culture Station. Chironomid larvae have been found to be the chief undesirable organism in milkfish ponds, because they compete with the milkfish for natural food (bottom algae) as well as destroy the algae bed on the pond bottom. The use of BHC and Diazinon has become now quite popular with the milkfish farmers in Taiwan. (*Comm. Fish. Rev.*, April 1959).

UNITED KINGDOM

HONG KONG

Shrimp Fishing Industry

Shrimp: The processing of shellfish (about 75 percent shrimp) has expanded rapidly in the British Crown Colony of Hong Kong since 1955. In the first nine months of 1958, exports of fresh, chilled and frozen shellfish totaled about 42 million pounds (value US\$2.6 million) as compared with about 2.5 million pounds (valued at US\$1.3 million) for the entire year of 1957. Only 0.4 million pounds were exported in 1955. It is estimated that more than 75 percent of the shellfish exports consist of frozen shrimp (head off).

The United States is Hong Kong's principal customer for shellfish (about 90 percent frozen shrimp). For the first nine months of 1958, exports of shellfish to the United States accounted for 79.5 percent of the total quantity and 85.4 percent of the total value.

No statistics are collected in Hong Kong on the landings of shrimp, but estimated from officials of the Department of Commerce and Industry place the annual average catch about 10 million pounds (head on).

In addition to the exports of fresh, chilled and frozen shrimp, Hong Kong

exports fair quantities of salted, dried, and pickled shellfish. During the first nine months of 1958, Hong Kong exported 68,000 pounds of cured shellfish (90 percent shrimp) to the United States or about 10 percent of total exports of 668,000 pounds to all countries.

Another source of statistical data on Hong Kong's foreign trade are figures on value compiled from the Comprehensive Certificates of Origin. Data derived from this source show that exports of frozen shrimp for January-October 1958 amounted to US\$2.6 million. During the same period shrimp noodles amounted to US\$55,000 and shrimp paste US\$35,000.

Fishing Seasons and Grounds:

There are two main fishing seasons for the Hong Kong shrimp fishing fleet. During the early season from April through the end of the typhoon season in September, the shrimp trawlers operate in the waters around the Colony. The primary area for shrimp at this season lies south and east of the Lema chain of islands, held by the Chinese Communists. Here the sea bottom falls off very gradually, beginning at about 20 fathoms. A secondary shrimp area is in the Urmston Roads off Castle Peak, within Colony waters. During the rest of the year, from October-March, shrimp trawlers must proceed northeast from Hong Kong, along the China mainland coast. Some trawlers are away for a month at a time during this season, going as far as 600 miles up the coast to grounds off Fukien Province.

Fishing Fleet: For the most part, Hong Kong's shrimp trawlers are sail-powered. The 1955-57 reports of the Director of Agriculture, Fisheries, and Forestry states that only 280 out of the 769 shrimp trawlers based in the colony

are motorized. Both types of trawlers use beam trawls with about a 10-foot spread, dragging either 7 or 9 such trawls from booms on either side of the boat and from the must. There have been no significant changes in the total strength of the shrimp-catching fleet from 1956-1958, although a large number have been mechanized in this period.

Species Landed: The principal species of shrimp landed at Hong Kong is *Metapenaeus monoceros*. Varieties of lesser importance are *Penaeus monodon*, *Penaeus japonicus*, and *Penaeus orientalis*. The latter species flourishes in waters colder than those surrounding the Colony and are landed by the trawlers that fish off the China coast in the winter months. Most of the *Penaeus orientalis* that is marketed in Hong Kong, however, is imported from Communist China.

Facilities and Processing: Shrimp are not canned in Hong Kong. There are 12 cold-storage plants which have freezing facilities for packing of shrimp for export. The bulk of this business is handled by the five plants which are approved by Government agencies under the Comprehensive Certificate of Origin procedure. Fair quantities of shrimp are sun-dried and used for food, while substantial quantities of shrimp paste are also made in the Colony.

In the Hong Kong market, shrimp (headless) are graded in size as follows: large shrimp, less than 30 to the pound; medium shrimp, 31 to 60 to the pound; and shrimp more than 61 to the pound. Large shrimp account for about 10 percent of the total catch, medium shrimp about 65 percent, and the remaining 25 percent small sizes.

Government Assistance: Some government assistance is afforded owners

of shrimp vessels in the form of low-interest loans. These loans are made only for the purchase and repair of craft and gear. They are made to the individual vessels either through cooperatives or direct by the Department of Cooperatives and Marketing or the Department of Agriculture. No financial assistance in any form is given to commercial processors or exporters by the government. There is no foreign participation in the Hong Kong shrimp fishery or processing industry.

Territorial Waters: The Chinese Communist regime has announced that its territorial jurisdiction extends to the 12-mile limit. While the British government does not recognize the

legality of this unilateral extension, the Communists have successfully excluded the Hong Kong fishing fleet from its waters. This has been done by imposing fines on Hong Kong-registered vessels found fishing within the 12-mile limit and in some cases by confiscation of the vessels. These restrictions severely hamper the growth and stability of the local fishing industry. Particularly is this true of Hong Kong-based shrimp fishing vessels which will have difficulty finding alternate fishing grounds to those in which they have traditionally fished. In view of these disturbing developments, the local shrimp fishing industry is likely to suffer rather than expand. (*Comm. Fish. Rev.*, March 1959).

SINGAPORE

Japanese to train Local Fishermen

The Japanese have agreed to a request by the Singapore Government to train some local fishermen in the techniques of pair-trawl fishing. These men will be trained in Japan through the agency of the Colombo Plan to aid in the development of Ceylon's offshore fishing. Three companies have already been licensed to engage in pair-trawl fishing.

The Technical Assistance to Singapore's fishermen through the Colombo Plan is in addition to the assistance already being extended by one of Japan's largest fishing concerns. It is understood that the new fishermen's training program will involve teachers from one of Japan's principal training schools. (*Comm. Fish. Rev.*, April 1959).

UNITED STATES OF AMERICA

HAWAII

The news notes on scientific activities of the Honolulu Biological Laboratory Hawaii, for the month of April 1959 gives the following information: Both of the laboratory's vessels departed on cruises during the month; the HUGH M. SMITH to study albacore in waters off

the southern California coast, the CHARLES H. GILBERT to continue the series of cruises planned to monitor the oceanographic factors and the distribution and abundance of season skipjack in Hawaiian waters. The primary missions of the biologists aboard the SMITH will be to

investigate the spring migration of albacore into the southern portion of the American west coast fishery and the concurrent oceanographic conditions. These studies will be carried out in a synoptic manner in cooperation with California Fish and Game Department scientists aboard the N.B. SCOFIELD. Routine oceanographic and meteorological observations, assessment of rates of photosynthetic carbon fixation, and plankton tows, in addition to the fishing by means of gillnet, longline and troll methods, will be undertaken from both vessels. Biologists from both vessels will meet in California after the completion of the cruise to assess results and plan for the preparation of the data and analytical reports.

Experiments were carried out to test a method for inducing early spawning in *Tilapia* and to determine the growth of young *Tilapia* in fresh water, brackish water (16‰) and sea water (33‰). These experiments are but two of a series designed to determine the economic feasibility of rearing *Tilapia* for use during skipjack live-bait fishing—for use as a supplement to the natural bait available to the Hawaiian fishermen.

To induce early spawning, heating cables were used in two tanks, one with a plastic cover. During the late winter months, January through March, the fry production in the control tank (unheated) was 5,980, 13,777 in the tank with heater and cover, and 14,767

in the tank with only the heater. The temperatures in the covered tank were as much as 10°F. higher than the control and were 2°F. higher in the uncovered tank. During March and April, air temperatures increased so that the control tank water temperatures did not differ greatly from those in the heated tanks. The production in each of these tanks for the two months was: 6,019 in the control, 1,649 in the covered, and 7,541 in the uncovered. It appears from these results that a relatively slight rise in water temperature may create favorable spawning conditions and that a relatively large increase in temperature is not necessary.

Growth of young *Tilapia* in the three aquaria, one each with fresh, brackish and sea water, was very poor, averaging less than 1 mm. per week, even though the concentration of young in the aquaria was similar to that which produced good growth in the larger outdoor tanks. On April 9, a new experiment was started in two outdoor tanks, each about 700-gallon capacity. In the first two weeks, the fish grew at a rate of 2 mm. per week in the tank with 6,000 fish and 3 mm. per week in the tanks with 3,000 fish. In the latter tank, the total growth was as great in two weeks as during five weeks in the aquaria. These growth experiments are being continued with emphasis on variations in growth as induced by variations in the type and quantity of the food given to the fish.

FAO ACTIVITIES

Dr. D.B. Finn, Director of Fisheries Division, visited Poland for discussions with the Government officials and inspected the Polish Fisheries Institutions.

He also attended the meeting of the International Whaling Commission held in London during June.

Mr. P.A. Lusyne spent two months

in India on an assignment to the fishermen's training centers. He also visited Saigon, Vietnam, for discussions regarding a training center for fishermen and to draw up preliminary plans.

Technical Assistance

Peter Gurtner, FAO Naval Architect has returned to India to complete his assignment, which started in February 1958.

Apart from continuing various projects which FAO naval architects have been engaged on in India during the past years, there are new development plans to be put into effect. One is an advanced course for boat designers, which will be held at Cochin, to follow up the previous courses held there.

Another important development will be to find out to what extent the builders of steel vessels in India can participate in the production of deep sea trawlers and other large ships which are now beginning to assume great importance in the development of fisheries in India. If one can design more seaworthy and more efficient deep sea fishing vessels, based on the experience gained in operating trawlers from Indian ports, it should be possible to provide valuable assistance to the companies engaged in this enterprise. Improvements in design and performance would undoubtedly help the companies to obtain better returns for the very large capital investments incurred in building and operating such vessels.

Before he left India for home leave in Switzerland, Mr. Gurtner had been active in producing final designs of FAO prototypes of fishing vessels which had been tested in various fisheries in India. These new designs include vessels of

25 ft., 32 ft. and 40 ft., as well as various other types of craft, especially those of shallow draught used in the estuarine fisheries. He was also responsible for modifying the prototype surf boat designed by FAO naval architects and for carrying out tests with this craft.

In addition, he interested boat-building yards, which had specialized in other types of craft, to go into the business of producing fishing boats, and promoted a model testing program at the testing tank at Poona which may have a considerable influence on fishing boat design in other countries in the Far East.

Dr. F.F.W. Morawa (Germany) will arrive at Headquarters on or about 13 July for briefing on his assignment as Assistant Expert Limnologist to Manila, Philippines.

Dr. Morawa will assist Dr. J.S. Dendy a T.A. Expert in Manila, under the FAO/German Government Assistant Expert Scheme, and his duties will be as follows:—

“To assist and work under the direct supervision of Dr. J.S. Dendy, the team leader of the project, in advising and assisting the Philippines Government in conducting limnological and fishery investigations of inland waters with a view to promoting fish culture”.

Dr. Morawa is engaged in scientific inland fisheries work for the French Service des Recherches Piscicoles, Direction Générale des Eaux et Forêts, Ministry of Agriculture, Thonon les Bains, France, and has carried out research on fresh water and marine fish stocks and races. He has also performed field work in India and aboard the research vessel ANTON DOHRN off the coast of Iceland. He is the author of many scientific publications.

Fellowships

Miss Bung-Orn Kasemsarn, Technologist at the Fishery Technological Laboratory, Bangkok, Thailand, has been awarded an FAO/ETAP Fellowship for one year to study fish processing technology of quality control. She will

spend five months at the Torry Research Station, Aberdeen, Scotland and will do part time research on freshness tests for fish. She will spend the rest of the period in Canada at the Fishery Technological Laboratories at Halifax and Vancouver.

IPFC AFFAIRS

The Executive Committee will have its meeting during the first week of October this year and will review the fisheries developments since the Eighth Session of the Council.

The Secretary of the IPFC circularized to Member Governments letters concerning the amendment of the Agreement of the Indo-Pacific Fisheries Council in accordance with the resolutions adopted at the 9th Conference of FAO held in November 1957. Replies from some of the Member Governments have been received while replies from others are being awaited. The Member Governments were also sent copies of a brochure on "Investigation into the German fishing industry" prepared by International Group of Consulting Engineers, Netherlands. Copies of "Report on the First Meeting of the Committee on the General Bathymetric Chart of the Oceans" held at Monte Carlo, 17-19 March 1959 and also a copy of "Result of the inquiry in connection with the General Bathymetric Chart of the Oceans" were circulated to the Member Governments.

Technical Committees, Activities of:

The Technical Secretary, Technical Committee II, Panels A and B, sent out the following circulars to the Panel Members: (1) a questionnaire on the Insect Infestation of Dried Fish. Replies

were received from Australia, Cambodia, Ceylon, India, Japan, Pakistan, Philippines, U.K. (Hong Kong) and U.S.A. These replies were transmitted to FAO Headquarters in Rome for compilation. (2) A newsletter in connection with a Swedish method of manufacturing fish flour for human consumption. (3) A newsletter on the development of an improved one-boat mid-water trawl by an FAO Fishing Gear Technologist. (4) A circular reminding the members of Technical Committee II, Panel B of the Council recommendations regarding Boiled Fish. Replies up to date have been received from Australia, Ceylon, Indonesia, Pakistan, U.K., Philippines, Japan and U.S.A., and Federation of Malaya. (5) A circular concerning material for the IPFC Fisheries Products Manual. (6) A circular requesting information for the IPFC *Current Affairs Bulletin*.

The Technical Secretary, Technical Committee II, Panel C sent out the following circulars: (1) A circular requesting information for "Report on Government Credit Facilities for Fishing Industries in the Indo-Pacific Region". (2) A letter enclosing a copy of a paper "Financial Assistance Schemes for the Acquisition or Improvement of Fishing Craft" prepared by FAO Fisheries Economic Branch. (3) A circular to the members of Technical Committee II, Panel C concerning the program of work

of the Panel during the current inter-session period.

Occasional Papers: The following

documents in the IPFC occasional Papers series have been issued during this year, up to August 1959.

- Occasional Paper 59/1 – A List of Commercial Fishes of Indonesia, by Mohammad Unar and M. Schlan.
- „ „ 59/2 – The Bank for Fishermen's Cooperatives, by Eddiwan.
- „ „ 59/3 – Synopsis of Biological Data on Milkfish, by W.H. Schuster.
- „ „ 59/4 – A List of Lake Plankton–Burma, by J.A. Tubb
- „ „ 59/5 – Dissolved Oxygen Determinations using a Polarograph Apparatus, by G.R. Fish.
- „ „ 59/6 – Fish Production and Consumption in West Java, by Rubbul Pahari.
- „ „ 59/7 – The Function and Significance of Fishculture in Relation to the Regional/Village Economy, by R. Soekarno.
- „ „ 59/8 – Some Experiments on Tuna Fishing with a New Method in the Indonesian Waters, by Mohammad Unar.
- „ „ 59/9 – A Method for Plankton Volume Determination.

PERSONALIA

Mr. John C. Marr, formerly Director of the Bureau of Commercial Fisheries Laboratory, La Jolla, California, has

been appointed Director of the Bureau of Commercial Fisheries Biological Laboratory, Honolulu, Hawaii.

CURRENT READING

Chin, E. and Allen, D.E. **A List of References on the Biology of Shrimp** (Family *Penaeidae*). *Special Scientific Report* No. 276, Jan. 1959. U.S. Fish & Wildlife Service, Washington 25, D.C., U.S.A. 143 p.p. in English.

Contains over 800 references of publications on the biology of shrimp (restricted to family *Penaeidae*) and Catching methods.

Fisheries Statistics of the Philippines, 1957. 62 pp., illus., processed. Department of Agriculture and Natural

Resources, Bureau of Fisheries, Manila, Philippines. This comprehensive report is devoted to fishery production in the Philippines. The tables are grouped together under the headings (1) production, consumption and requirement; (2) commercial fishing vessels; (3) fish ponds; (4) foreign trade; and (5) other data. Subdivision of the tables is made according to gear, kind of fish caught, monthly production and fishing grounds. Statistics also cover reptile skins, seaweeds, sharkfins, shells, sponges, trepang,

turtle eggs, and turtle shells. The appendices contain information on the fishery districts, the forms use in collecting fishery statistics, and an inventory of fishing gear used in the Philippines for the year 1953. Except for Table 1, which presents fish production data since 1946, most of the information covers the five-year period 1953-57.

A.F.M.G. Luijpen. **De invloed van het Kaken op de Rijping van Gezontheu Maatjesharing** (Influence of Gibbing on the Ripening of Maatjes Cured Herring). Drukkerij Schotanus and Jens, Utrecht, the Netherlands. 91 p.p. In Dutch, with English Summary.

In the few publications which deal with the reactions that occur during the ripening of salted herring, there is no unanimity about the part played by proteolytic enzymes.

After a description in Chapter I of the way in which maatjes herring have been cured for centuries aboard the Dutch fishing ships, a survey is given in Chapter II of the methods of analysis used in the course of the investigations. The most important of these were the determinations of the activity of the endopeptidases by the method of Anson and of the activity of the exopeptidases by the method of Grassmann and Heyde.

Using these methods, an investigation described in Chapter III was set up into the existence of proteolytic enzymes in the muscles and intestines of the herring. In freshly caught maatjes herring, the trypsin in the pyloric caecae makes the most substantial contribution to the total endopeptidase activity, as measured at the pH values normally found in herring brines. Although considerable quantities of pepsin are present in the stomach, the activity of this enzyme in

the pH range of herring brines is of little importance. The activities of the kathepsins in the liver and in the muscles are negligible compared with those of the endopeptidases in the intestines. This is not true for the exopeptidases of the muscles, however. The total amounts of dipeptidase and aminopeptidase are greater in the muscles than in the intestines. The carboxypeptidase activity is chiefly concentrated in the pyloric caecae.

Chapter IV deals with experiments showing the influence of sodium chloride on the activities of the enzymes. At salt concentrations that are normal in maatjes cured herring, the activities of the endopeptidases are still considerable. The activities of the exopeptidases are more strongly inhibited than those of the endopeptidases. Storage experiments with endopeptidase extracts containing sodium chloride show that initially the activity of the trypsin as well as that of the pepsin decreases rapidly, under the conditions of the experiment, but that ultimately the trypsin has the greater residual activity of the two. At temperatures usually encountered in herring cold stores, differences of a few centigrade degrees have little influence on the velocities with which the activities of the enzymes decrease.

In Chapter V the changes in the activities of the endopeptidases during storage of maatjes cured herring are described, as well as the changes the herring itself undergoes because of the enzyme action. The results show that the trypsin activity of the brine passes through a maximum, and appears to be but little dependent on the storage temperature, within the limits investigated. Organoleptic testing and deter-

minations of tyrosine showed that the velocity with which the herring was ripening was markedly influenced by temperature.

When gibbing herring in practice, not always the same parts of the fish are cut away, so that the proportions of the proteolytic enzymes in the barrels are not constant. Hence the proportions can also be changed intentionally by varying the usual gibbing procedure. The results of the storage experiments with maatjes cured herring, gibbed in different ways as described in Chapter VI, prove that LIEBERT was right in stating that the presence of pyloric caecae was necessary for the development of the desired organoleptic properties of salted herring. Maatjes herring gibbed in such a manner that the pyloric caecae were cut away, either alone or together with the stomach, resulted in an inferior product after storage in the cured condition.

Chapter VII deals with attempts to find out whether the trypsin is secreted in the pancreatic tissue that grows like a net-work over the pyloric caecae, or directly in the caecae themselves. Application of biochemical methods gave no decisive answer to this question. The same methods applied to the intestines of perch showed that the mucous membrane of the caecae had no pancreatic function, but was closely related to the mucous membrane of the long gut. Examination of microscopic preparations proved that the structures, on the one hand, of the caecae of perch and herring, and on the other, the pancreatic tissue growing over the caecae of both species were highly analogous. From the slides it was clear that the network over the

pyloric caecae of herring consisted of pancreatic tissue.

A.A. Racek. **Prawn Investigations in Eastern Australia** (pp. 57), *Research Bulletin* No. 6 published by State Fisheries Department, New South Wales.

This is an account of the results of scientific investigations on commercially important penaeid prawns of the inshore and offshore waters of New South Wales and adjacent regions carried out over a period of 3 years. The stocks distribution, zoogeographical and ecological boundaries, migrations, abundance, sex ratio, maturity and the effect of lunar periodicity on abundance, migration, moulting, breeding and activity have been located and the distribution of planktonic larvae, as well as the seasonal influx of demersal postlarvae into the estuaries have been established. The contents of the different chapters are as follows:

After an Introductory Chapter, the Methods employed during the investigation are described. The other Chapters cover Results of Investigations and the Prawn Fisheries of Eastern Australia. There is a Bibliography of 31 References.

John S. Lake. **The Fresh Water Fishes of New South Wales**, *Research Bulletin* No. 5 published by State Fisheries Department, New South Wales (pp. 19).

This contents synopsis of biological data on 39 species of Australian fresh water fish, 9 species of introduced fresh water fish and 17 species of salt water fish occasionally entering fresh water. There are 7 plates which illustrate the lakes and river systems important in New South Wales and various species of the fish dealt with in the text.

MEETINGS AND CONFERENCES

International Meeting on Research Vessels

At the meeting of the UNESCO Executive Board held in Paris in June 1959, it was decided to accept the offer of the Danish Government to hold next year in Denmark an international conference to discuss the operation of international oceanographic vessels and the application of an international program of research and training in the marine sciences. The agenda of the conference is to be drawn up by a group of 20 experts who will meet next September or October,

following the Oceanographic Congress in New York. Invitations to next year's conference are to be sent to all UNESCO's member states as well as to countries members of the UN but not of UNESCO. The main topic of discussion will be the form under which to carry out the UNESCO 10th General Conference resolution on "Operation of international oceanographic vessels". There are proposals for a ship built, equipped and operated by the Organization and others for the international operation of one or more existing vessels whose equipment would be modernized.

FORTHCOMING CONFERENCES, MEETINGS AND TRAINING CENTERS

<i>Date</i>	<i>Subject of Conference</i>	<i>Convening Body and/or Organizers</i>	<i>Location</i>
August 19 - 26	International Institute of Refrigeration - 10th International Congress	Secretary, International Institute of Refrigeration, 177 Boulevard Malesherbes Paris 17e.	Copenhagen
20 - 8 Sept.	14th International Limnological Congress	Dr. T.T. Macan General Secretary and Treasurer, International Association of Limnology, c/o Freshwater Biological Association, Ferry House, Ambleside, Westmorland, England	Vienna
30 - 12 Sept.	International Oceanographic Congress	American Association for the Advancement of Science in Cooperation with UNESCO, the Special Committee on Oceanographic Research of ICSU, and FAO Dr. Mary Sears Chairman, Committee on Arrangements, Woods Hole Oceanographic Institute, Woods Hole, Mass., U.S.A.	New York
September 14 - 21	FAO World Scientific Meeting on the Biology of Sardines and Related Species	Mr. H. Rosa, Jr. Fisheries Division, FAO, Rome.	Rome
2nd half	ECAFE - Working Party on Small-scale Industries and Handicraft Marketing- Canning and Bottling of Fruits and Food in Cooperation with FAO	Executive Secretary, Economic Commission for Asia and the Far East, Sala Santitham, Rajadamnern Avenue Bangkok, Thailand.	Undet.
22 Sept. - 2 Oct.	Expert Meeting on Fishery Statistics in the North Atlantic Area	Fisheries Division, FAO, Rome.	Edinburgh
28 Sept. - 2 Oct.	ECE - Working Party on Standardization of Perishable Foodstuffs - 10th Session	Executive Secretary, Economic Commission for Europe, Palais des Nations, Geneva.	Geneva

<i>Date</i>	<i>Subject of Conference</i>	<i>Convening Body and/or Organizers</i>	<i>Location</i>
October	CCTA - Symposium on Biology and Maritime Fisheries of the East African Coast	Executive Secretary Commission for Technical Co-operation in Africa, South of the Sahara	Cape Town
	CCTA - Symposium on Sea Fisheries on the West Coast of the Indian Ocean	"	Cape Town
	CCTA - Meeting of Specialist on Hydrology	"	Ghana
-	European Inland Fisheries Advisory Commission	Fisheries Division, FAO, Rome	Dublin
November 2-26	FAO Conference - 10 Session	-	Rome

1960

October	General Fisheries Council for the Mediterranean, 6th Meeting	Mr. M.J. Girard Regional Officer for Europe and Near East.	-
2nd half	5th FAO Regional Conference for Asia and Far East	-	-
Last Quarter	Indo-Pacific Fisheries Council, 9th Session	-	-

FAO TRAINING CENTERS AND SEMINARS

1959

1-8 Aug.	FAO Seminar on Food Technology for Asia and the Far East	Dr. S.S. De Regional Nutrition Officer, FAO, Bangkok.	Mysore
17 Aug. - 18 Sept.	International Training Center on Fishery Statistics for the Mediterranean African, and the Near East Region	Mr. F.E. Popper Fisheries Division, FAO, Rome.	Copenhagen
9 Nov.	International Training Center on Fishery Surveys	Dr. G.L. Kesteven Fisheries Division, FAO, Rome.	Tanga

1960

-	FAO/ETAP Training Center on Fishing Methods & Gear	FAO Fisheries Division, Rome.	Egypt
---	--	----------------------------------	-------

IMPORTANT IPFC PUBLICATIONS

PROCEEDINGS (Records of Council Sessions, normally held once every two years)

First Meeting, Singapore, 24 - 31 March 1949

Section I:	Report of Proceedings
Section II:	Working Papers
Section III:	Contributed Papers
Section IV:	Symposium Papers

Second Meeting, Cronulla, N.S.W., Australia, 17-28 April 1950

Section I:	Report of Proceedings
Section II:	Technical Papers
Section III:	Symposium Papers

Third Meeting, Madras, India, 1-16 February 1951

Section I:	Report of Proceedings
Section II:	Technical Papers
Section III:	Symposium Papers

Fourth Meeting, Quezon City, Philippines, 23 October - 7 November 1952

Section I:	Report of Proceedings
Section II:	Technical Papers and Symposium Papers

Fifth Meeting, Bangkok, Thailand, 22 January - 5 February 1954

Section I:	Report of Proceedings
Section II:	Technical Papers
Section III:	Symposium Papers

Sixth Session, Tokyo, Japan, 30 September - 14 October 1955

Section I:	Report of Proceedings
Section II:	Technical Papers
Section III:	Symposium Papers

Seventh Session, Bandung, Indonesia, 13 - 27 May 1957

Section I:	Report of Proceedings
Section II:	Technical Papers
Section III:	Symposium Papers

Eight Session, Colombo, Ceylon, 6 - 22 December 1958

In Preparation

CURRENT AFFAIRS BULLETIN (Quarterly)

No. 1-24, July 1951 - April 1959

SPECIAL PUBLICATIONS (Irregular)

- No. 1: Schuster, W.H. (1952). Fish Culture in Brackish-water Ponds of Java. 1-143 pp.
- No. 2: Anonymous, (1952). Fish Culture in Indonesia. 1-126 pp.
- No. 3: Zaneveld, J.S. (1955). Economic Marine Algae of Tropical South and East Asia and their Utilization. 1-55 pp.
- No. 4: Anonymous, (1958). Annotated Bibliography on Fishing Gear and Methods.

OCCASIONAL PAPERS (Irregular, Mimeo)

- No. 52/3 Annotated Bibliography on the Culture of Milkfish, *Chanos chanos* (Forsk.), by Walter H. Schuster.
- No. 52/9 Control of the Quality of Salted Dried Fish, by M. Lafont.
- No. 52/10A. Bibliography of Fishing Gear Preservative, by B.Y. Datingaling and J.I. Sulit.
- No. 54/1 The Status of the Fisheries in River Basin Development, by C. Miles and T.J. Job.
- No. 55/2 Sampling Methods used in Japanese Fisheries Catch Statistics, by T. Yamamoto (Printed).
- No. 57/1 Documents published by and otherwise contributed or presented to IPFC through 1948-1956.
- No. 59/3 Synopsis of Biological Data on Milkfish *Chanos chanos* (Forsk.), 1775, by W.H. Schuster.
- No. 59/4 A List of Lake Plankton—Burma, by J.A. Tubb.
- No. 59/5 Dissolved Oxygen Determinations Using a Polarograph Apparatus, by G.R. Fish.
- No. 59/6 Fish Production and Consumption in West Java, by Rabdul Pahari.
- No. 59/7 The Function and Significance of Fish Culture in Relation to the Regional/Village Economy, by R. Soekarno.
- No. 59/8 Some Experiments on Tuna Fishing with a New Method in the Indonesian Waters, by Mohammad Unar.
- No. 59/9 A Method for Plankton Volume Determination.

MISCELLANEOUS

Directory of Fisheries Institutions—Asia and the Far East.